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By- Crowley, Francis J.; And Others

# A COMPARISON OF THE LISTENING ABILITY OF BLIND STUDENTS AND THE LISTENING ABILITY OF SIGHTED STUDENTS IN THE INTERMEDIATE GRADES.

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To determine whether differences exist in their listening ability, 152 blind braille-reading and 2 sighted children in the intermediate grades were studied. Subjects were classified into three ability levels on the basis of their scores on individual IQ tests. The Listening Subtest of the Sequential Tests of Educational Progress was administered at rates of 175 and 225 words per minute with the four types of listening material: expository, narrative, direction, and aesthetic. The measured listening ability of the sighted subjects was generally superior to that of the blind (p=.05), with the sighted superior in listening to expository and narrative material. Intelligence was positively related to measured listening ability. Order of administration or type of school (special school or integrated class) did not constitute a significant variable. Scores achieved at the regular rate were significantly higher than at the speeded rate (p=.01). Neither speededness nor intelligence acted selectively in influencing the scores of the blind and the sighted. Recommendations are made for education and research. A bibliography cites 83 items; 32 tables present data. (KH)

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Francis J. Crowley, Ph.D.
Barbara W. Lake, Ed.D.
Sister Jean Marie Rathgaber, O.P.

Fordham University
School of Education

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Chief Co-Investigators: Francis J. Crowley, Ph.D.
Barbara W. Lake, Ed.D.

Research Assistant: Sister Jean Marie Rathgaber, O.P.

Fordham University
School of Education
Fordham Road and Third Avenue
Bronx, New York 10458

1965

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# SECTION I

## The Problem

### Focus of the Problem

Because all knowledge came to man through his senses, each of the five senses constituted an important factor in learning. For the sighted child, touch, taste, and smell, were outranked by sight and hearing in the acquisition of knowledge. Emphasis in elementary education was directed to the development and perfection of those visual skills which facilitated learning. Although past research indicated that a major percentage of children's class time, and of adult communication time, was devoted to listening (Nichols, 1960; Rankin, 1930; Wilt, 1950), proficiency in the auditory communication skills received only cursory and insufficient consideration (Toussaint, 1960). The lack of attention to children's listening competence was apparent both in the area of instruction and of research (Anderson, 1952; Hampleman, 1958). The Commission on the English Curriculum (1952) stated that because of their importance in effective learning, good listening habits should be developed at all levels of instruction. In his review of findings in listening in the past decade, however, Keller (1960, p. 29) stated that "a look at research in comparable fields (e.g. reading, speaking) makes listening research look embryonic."

The auditory and tactile senses provided the chief channels of learning for the blind. Because the residual senses, the olfactory and gustatory, were less useful in the acquisition of knowledge about tangible materials, visually handicapped children relied extensively for concrete experiences upon direct contact with objects. The braille system provided a tactual communication channel which was of inestimable value to the visually handicapped, and which made it possible for the blind to become literate. As children progressed through the grades, however, educators realized that they could not rely on braille texts alone. If one considered that a braille copy of a vest pocket dictionary consisted of seven volumes totaling 1488 pages, it became clear that the blind child could not learn by tactile reading so quickly as his sighted peer learned by visual means. Since the average rate of tactual reading was only thirty to forty percent that of sight reading, the blind student had to read approximately three times longer than the sighted student (Foulke, Amster, Nolan and Bixler, 1962). Obtaining sufficient braille materials was progressively more difficult at the high school, college, and graduate levels (Nolan, 1963a). Even if a student had been fortunate enough to have had all of his basic texts in braille, he required additional resources for research and out-of-school assignments. Such materials were difficult to obtain in braille and the student could rarely afford to wait the length of time required to have them transcribed. It was imperative that the student obtain the necessary resource materials in media other than braille. He had to rely on oral presentation of materials by readers, or on the use of talking books, discs, or tape recordings. Listening performance, therefore, played a major role in the education of the blind child; listening became increasingly more important as that education advanced.

In addition to having one less sense with which to learn, the blind child's problem was further augmented by the fact that lack of sight placed serious restrictions on his mobility. A casual, everyday activity, such as visiting a playmate's house, became a serious and somewhat dangerous adventure for the young blind. More than upon any of his other senses, the blind child's mobility was dependent upon his effective listening. Auditory clued contributed information which built up his knowledge of spatial relationships. Orientation in the home, in the school, and in the community was facilitated by experience and training in that kind of listening which helped to locate stairwells, doorways, walls, and obstructions. By utilizing auditory and tactile information optimally, he developed skill in localizing sounds, in estimating distances, in judging dimensions, in detecting obstacles by means of reflected sounds, and in listening selectively, in situations where other noises made sound discrimination and interpretation most difficult.

Objectives and Statement of the Problem

It was the purpose of this investigation:

1. To determine, through the use of standardized listening tests, the difference, if any, in the listening ability of blind subjects and the listening ability of sighted subjects in the intermediate grades.

2. To measure the difference between the listening ability of blind subjects and that of the sighted subjects and each of the following factors:

(a) auditory communication rate
(b) kind of material heard
(c) level of intelligence
(d) type of school attended by the blind subjects.

3. To provide data which would contribute to the improvement of methods of teaching blind children.

4. To investigate the effect of communication rate on listening ability and to explore the feasibility of using accelerated word rates in presenting learning materials orally to blind children in the intermediate grades.

Specifically, the study endeavored to answer the following questions:

1. Was there a significant difference in the listening ability of the blind subjects and the listening ability of the sighted subjects in this study, as

determined by the STEP Listening Tests recorded at regular speed? At accelerated speed?

2. Was there a significant difference between the listening ability of the blind subjects tested at the normal reading rate and at the accelerated rate as measured by the STEP Listening Tests?

3. Was there a significant difference between the listening ability of the sighted subjects tested at the normal reading rate and at the accelerated rate as measured by the STEP Listening Tests?

4. Was there a significant difference between the listening ability of the blind subjects and the listening ability of the sighted subjects for each of the kinds of material heard, namely, expositive, narrative, directive, and aesthetic materials?

5. Was there a significant difference between the listening ability of blind subjects and that of sighted subjects at each of these three levels of intelligence, namely, high, average, and low, at regular speed? At accelerated speed?

6. Was there a correlation between level of intelligence (high, average, and low) and listening ability of the blind subjects tested at regular speed? At accelerated speed?

7. Was there a correlation between level of intelligence (high, average, and low) and listening

ability of the sighted subjects tested at regular speed? At accelerated speed?

8. Was there a significant difference in the listening ability of subjects attending special schools for the blind and the listening ability of blind subjects attending integrated programs?

## Definition of Terms

Certain terms employed throughout this investigation required definition. These defined terms included: legally blind, braille readers, integrated programs, special schools, intermediate grades, intelligence levels, listening ability, auditory communication rate, regular speed, accelerated speed, Order One and Order Two.

Legally blind. The term legally blind had no internationally accepted definition (American Foundation for the Blind, 1963). The definition most widely accepted by the federal and state governments in the United States, and by the American Foundation for the Blind (1963), described as legally blind those persons whose central visual acuity was 20/200 or less in the better eye, with correcting lenses; or whose central visual acuity was more than 20/200 if the peripheral field was restricted to such a degree that the widest diameter of the visual field subtended an angular distance no greater than twenty degrees.

Braille readers. This term was employed to designate those students who used braille because their visual defects made it impossible or unsafe for them to read ordinary or large print books.

Integrated programs. This term was used to designate educational programs in which the blind attended the public or parochial schools for the sighted. In this investigation the integrated programs included two types:

1. Itinerant teacher service: was one in which the blind child was enrolled in the regular class in his local school. Educational services were provided for the blind child through the cooperative efforts of the regular class teacher, and those of the itinerant teacher, who was qualified to offer specialized services such as instruction in braille (Taylor, 1959). The itinerant teacher traveled to two or more schools (Good, 1959) and worked with the individual blind children according to a pre-arranged schedule for a specified number of hours each week.

2. Resource room program: was one in which the blind child was enrolled in a sighted school which provided one or more full time qualified teachers of blind children, and a resource room. The resource room was a specially equipped room where the blind child received whatever individual instruction he required and from which he went to the regular classrooms for certain periods of his school day (Manshardt, 1959).

Since both of these programs educated blind children with sighted children in the regular public or parochial schools, they were designated without differentiation in this investigation by the term integrated programs.

Special School. This term was defined by Good (1959) as a school which was established to care for the educational needs of atypical children; it provided special education for exceptional children. In this investigation the term special school identified a school established and maintained for the education of blind children.

Intermediate grades. The intermediate grades were defined by Good (1959, p. 197) as "... those elementary grades between the primary level and the junior high school level: grade 4, 5, or 6."

Intelligence levels. The intelligence quotients of the subjects were categorized in three ability levels by means of standard scores. The three ability levels were designated as follows:

(a) High: Intelligence quotients above +.5 s.d.
(b) Average: Intelligence quotients from -.5 s.d. to +.5 s.d.
(c) Low: Intelligence quotients from -.5 s.d. to -1 s.d.

Listening Ability. This term was employed to designate the competence with which spoken language was understood by the subjects in this study, as this competence was measured by the STEP Listening Tests. The term listening ability was used in this investigation as Brown (1950) employed the term "auding," to describe the process by which one recognizes and interprets spoken symbols.

Auditory communication rate. This term was employed to designate the speed at which an individual comprehended spoken language.

Regular speed. This term was employed to indicate a recording speed of approximately 175 words per minute. This was the average reading rate used by the American Printing House for the Blind in recording Talking Books (Nolan, 1963a).

Accelerated speed. This term was employed to indicate a recording speed greater than 175 words per minute. The accelerated rate used in this investigation was recorded at approximately 225 words per minute.

Order One. This term was used to designate that group of subjects to whom the initial listening test was administered at the regular recording speed.

Order Two. This term was used to designate that group of subjects to whom the initial listening test was administered at the accelerated recording speed.

## Significance of the Problem

Since sight normally provided more stimuli to the brain than all the other senses taken together (Fouracre, 1960), every remaining avenue of knowledge became more significant and valuable in the education of the blind. Because the totally blind were incapable of learning through visual means, the remaining sensory endowments had to be explored more diligently, developed more thoroughly, and utilized optimally. The chief media of communication and learning possible for the blind were touch and sound. An excellent tactile system of reading and writing resulted from the continuous study and refinement of the braille system, and of the techniques and methods of teaching braille. Much remained to be done in the field of auditory modes of learning. Throughout history listening has had an important place in all interpersonal communication (Nichols and Stevens, 1957), but its contribution to learning could scarcely be overestimated for those children whose sensory experiences were limited by blindness. This investigation was not concerned with establishing the primacy of listening over braille reading in learning by the blind. The investigator believed that "reading by ear" should supplement braille reading, not replace it. Every available resource had to be utilized to compensate, at least partially, for the sensory limitations imposed by blindness. Many blind individuals expressed a preference for a particular mode of reading. Research done by the American Foundation for the Blind (Josephson, 1964), which included nearly a thousand adults, reported that among those who had lost their vision before their fifteenth year, one-fifth depended on braille, and two-fifths on records. Among those who had lost vision late in life only one per cent relied on braille; many readers in both groups employed more than one method. Recent research reflected the effects of technology on the reading habits of the blind; the trend strongly favored the use of recorded materials. According to the American Library Association, braille books were regularly borrowed from the Library of Congress, Division for the Blind, by 13,000 blind readers; talking books were regularly borrowed by approximately 70,000 blind readers (Haycraft, 1964). The annual report of Recording for the Blind (1963) reflected a 400% increase in the production of recorded discs in the six year period from 1958 to 1963. Despite this large increase in volume, (10,000 educational books in 1963), the organization was unable to supply the continually rising demand for recordings, and only partially met the needs of the majority of blind college and university students.

It was evident from these statistics that listening constituted a significant and vital area of research in the education of the visually handicapped. The present study of listening included in its investigation the practicality of using speeded recordings. As mentioned previously, the faster pace of reading print put the blind student at a disadvantage; there existed a need for increasing auditory reading speeds (Carter, 1962). Although it caused serious distortion, some blind students listened to their 33 1/3 rpm records at 45 rpm in order to reduce their time handicap in reading (Haycraft, 1964).

The establishment of more effective and economical educational programs for both the blind and the sighted required answers to several questions. Were blind and sighted children using their auditory abilities maximally? Did elementary school children require more formal training in auditory skills? Which types of material were comprehended adequately through listening? At what speeds did young children comprehend materials satisfactorily? What was the relationship between level of intelligence and listening ability?

The investigator believed, that since research in the area of listening was practically unexplored on the elementary school level (Anderson, 1952; Hackett, 1955; Hampleman, 1958), the present research problem was educationally significant because it:

(a) studied listening ability of blind and sighted children in the intermediate elementary grades.

(b) employed standardized listening tests with the blind.

(c) included several types of materials, namely, stories, explanations, directions, poems, and arguments.

(d) administered the recorded listening tests at two different auditory rates.

(e) included blind children from integrated programs, as well as children from special schools for the blind. Because of the difficulty of reaching the children who were widely dispersed in many different schools in the integrated programs, previous allied research had been restricted, almost exclusively, to students in residential schools.

## Limitations of the Study

This study was limited with respect to the following factors:

1. Scope. The investigation was confined to an analysis of the measurable effects of blindness, auditory reading rate, kinds of material heard, and type of school attended by the blind subjects, on listening ability, as indicated by the scores obtained on two equivalent forms of a standardized listening test recorded at a speeded and at a non-speeded rate.

2. Subjects. The testees in this investigation were limited to: (a) One hundred fifty-two legally blind braille readers of both sexes in the intermediate grades. These subjects attended integrated programs in public or parochial schools in the New York Metropolitan Area, or attended one of the three special schools for the blind in New York State. (b) One hundred fifty-two sighted students of both sexes in the intermediate grades who attended public or parochial schools in the New York City Metropolitan Area.

The study might have been enhanced if it had been extended to include students at the junior or senior high school level. In curriculum planning it would be essential to know the average variation between the listening ability of intermediate grade children and that of more advanced students. However, such a procedure would have forced the investigator to reduce the number of participants in each group by half. To insure the validity of the conclusions, the study was therefore confined to a larger and more representative sampling of the intermediate grades only.

3. Measuring Instruments. (a) Measurement of listening ability was limited to the use of the STEP Listening Tests: Forms 4A and 4B. (b) The scores used to classify the subjects with reference to level of intelligence were obtained from the records of the individual schools attended by the subjects. Several intelligence tests were represented; the scores for the blind subjects were obtained from individually administered tests. This procedure was justified because: (1) group intelligence tests have not been found satisfactory for use with the blind (Davis, 1962; Pearson, 1963; Sargent, 1931), (2) individual testing of the sighted would have been prohibitively expensive and time consuming, (3) the experimental design of the study required that intelligence be categorized in broad areas of ability only. The individual intelligence scores were appropriately assigned to one of three ability levels by means of standard scores within each group, sighted and blind.

# SECTION II

## Related Research

The studies reviewed in this section were selected because they were most relevant to one or more of the variables investigated in this comparison of the listening ability of blind and sighted children. In order to provide a frame of reference, the research material was organized under the following topics: (1) listening ability and sightedness, (2) listening ability and rate of oral presentation, (3) listening ability and types of listening material, (4) listening ability and intelligence.

A survey of related research verified that no studies had been made comparing the listening ability of blind children from special schools for the blind, and the listening ability of blind children from integrated programs. This situation was anticipated and was one of the reasons that the present study was inaugurated.

### Listening Ability and Sightedness

Hartlage (1963) compared the listening comprehension of 50 blind and 50 sighted high school students aged 16 to 19 years. The blind subjects, 26 males and 24 females, were braille readers representing the total enrollment of pupils from four state schools for the blind, who satisfied the age and braille reading requirements of the study. Each of the 50 sighted students was paired with a blind subject who was comparable in age, sex, and intelligence. All of the sighted subjects were students at the same high school. A reading selection, "The Yellow Turtle-neck Sweater," taken from a seventh grade prose and poetry book, had been recorded on tape at a rate of 175 to 180 words per minute and used for an earlier research study (Foulke, Amster, Nolan and Bixler, 1962). The selection was at the fifth and sixth grade level of readability as determined by the Dale-Chall formula. The subjects listened to the recording, and were tested immediately after the reading. A 36 item, multiple-choice test was used to measure the listening comprehension of the blind and sighted groups. The findings showed that the mean scores achieved were 28.30 for the blind and 28.43 for the sighted. The Sign test revealed a slight, but nonsignificant superiority of the sighted over the blind (Z value .4629; probability .3228). The Wilcoxon matched-pairs signed-ranks test also revealed no significant difference between the two groups (Z value .01003; probability .4960). Intelligence of both groups correlated with comprehension; +.79 for the blind and +.66 for the sighted. Hartlage concluded that with the variables of age, intelligence, and sex controlled, sightedness versus blindness was not found to be a significant variable in listening comprehension. He did call attention to the fact that the ceiling on the test was too low to differentiate subjects at the upper levels where there was a clustering of scores.

## Listening Ability and Rate of Oral Presentation

The basic problem in Goldstein's study (1940) was a comparison of reading and listening comprehension at various controlled rates of presentation. He sought, also, to determine the relationship between comprehension in reading and listening with both intelligence and the difficulty level of the material presented. The subject sample, which included 280 sighted adults, male and female, aged 18 to 65 years, had a mean age of 34.3 and a mean mental age of 15.9. The group was selected as being representative of a cross-section of adult population in terms of intelligence, cultural background, and education, as measured by standardized tests. The subjects were tested in 28 groups of ten subjects; each subject of the group represented a different decile ranking in intelligence. Twenty-eight passages taken from the McCall-Crabbs Standard Test Lessons in Reading were equated to provide for interpretation of the data according to equivalent grade scores. The materials were at two levels of difficulty, corresponding on the average to grades 3.5 and 7.5. There were 14 passages at each level of difficulty. The rates of presentation ranged from 100 to 322 words per minute; motion films and phonograph records provided controlled rates for the visual and auditory presentations. The findings relevant to the present study showed that rate was a highly significant factor; the F-ratio of 6.65 exceeded the value required at the .01 level. Variation among the 28 subject groups was significant at the .05 level with an F-ratio of 2.69; one fourth of the group scored significantly higher on one or the other mode of learning. The data showed a consistent decline of reading and listening comprehension with rate. The decline for both forms of communication was slight for the first few rates, but became accelerated at the faster speeds. The average listening score at 100 words per minute was 21.91; at the 211 word rate the average was 21.50; at 248 words per minute 20.70; and at 322 words per minute the average score was 19.56. Both reading and listening comprehension were conditioned by the intelligence factor. The more intelligent subjects achieved higher listening grade scores (11.41) at the 325 word rate than the least intelligent earned (8.49) at the 100 word rate presentation. Relative superiority of listening over reading diminished as difficulty of material increased.

In her study of listening comprehension, Fergen (1954) investigated the effect of rate of oral presentation on the listening comprehension of 438 sighted children in grades four, five, and six. The four equivalent forms of the Iowa Every-Pupil Tests of Basic Skills, Test A, Elementary Battery, Grades 3,4,5, Silent Reading

Comprehension, were adapted for phonographic presentation at rates of 80, 130, 180, and 230 words per minute. From a speed of 80 words to a speed of 230 words per minute, the highest listening comprehension was achieved at 130 words per minute. Like Goldstein (1940), Fergen found that the more intelligent subjects exhibited greater listening comprehension ability at the fastest speed than the less intelligent did at the slowest speed. In light of the fact that the slow speed may have hindered comprehension, however, Fergen warned that the difference may have been a spurious one.

In Harwood's (1955) study, a series of language samples graded for seven different levels of predicted readability were presented at four different rates of delivery. Harwood wished to determine (1) whether listenability was affected by rate of presentation, (2) whether the effects of presentation rates were consistent, and (3) whether readability consistently predicted listenability at the various rates. Four hundred eighty-seven sighted boys and girls in the tenth grade of one school system were tested. Each different fourth of the subjects heard all seven stories at one of the four different presentation rates. The subjects who heard the 200 word rate presentation did not differ significantly from those who heard the 175 word per minute presentation in distribution of age, intelligence quotient, and reading comprehension grade placement. The subjects who heard the 125 word rate presentation differed significantly (.05 level) from each of the two other groups in one or more of the attributes of age, intelligence quotient, and reading grade. Harwood stated that the differences were small enough to have little or no effect on the major findings of his investigation. Copy for the seven stories, each of which was 300 words long, was selected from United Press Radio Teletype dispatches, from commentary and reports of the Columbia Broadcasting System radio network, and from transcripts of public addresses. Each story was tape-recorded at the separate rates of 125, 150, 175, and 200 words per minute by the same male reader. The findings agreed with those of Goldstein that, in general, listenability decreased as the rate of presentation increased. The mean listenability at each of the four presentation rates, however, did not differ significantly from that at any other. Rank-order listenability of the stories at each presentation rate was highly consistent with that of every other. The rank-order intercorrelations, which ranged from .96 to 1.00 were significantly greater than zero at the .01 level. Six of the seven stories showed no significant listenability differences between the 175 and 200 word rate presentations. The story which had been placed fifth in readability was found to be significantly less listenable at the 200 word rate presentation. Harwood indicated that the story might be considered to contain more technical information than the other six stories. Rank-order listenability at each presentation rate was consistent with predicted rank-order readability. All rank-order correlations exceeded significance at the .01 level.

A method of speech compression, by means of which the delivery rate of a previously recorded message was increased, was employed in a study reported by Fairbanks, Guttman, and Miron (1957). The investigators studied the effects of time compression upon comprehension of spoken messages. The subjects were 224 male Air Force trainees. Two relatively long messages of a technical nature, originally recorded at a representative rate, were automatically compressed in time by selected amounts, and presented to the subjects. The compression technique operated upon the original recording only in the time dimension so that the several versions of the message differed in total listening rate. The findings showed that subjects who heard the messages with fifty per cent compression at a rate of 282 words per minute had a mean listening score which was approximately 90% of that for the subjects who had listened to the original 141 word per minute version. If the requirements of a particular communication situation were satisfied by such a comprehension level, then fifty per cent of the original message time was available. If increased comprehension of one message were required, a compressed version, plus reinforcing material, could be added within the time saved.

Another investigation utilizing time compression was pursued by Iverson (1956). Forty-five blind high school students in the Department for the Blind at a state school for the blind and deaf were the subjects of the study. Sample tapes played with 25 percent and 50 percent time compression, were followed by a questionnaire which required the students to indicate the percent of compression they judged most desirable. The greatest number of students believed 35 percent to 40 percent time compression would be most satisfactory for general-fiction books. This rate would permit a person to read a recorded book in 65 percent of the time required without compression. Of the 45 students, 39 indicated that they thought time compression should be used on books recorded for the blind. The study had interest, but it was conducted with a very small sample, the material was limited to fictional literature, the results provided opinions only, and comprehension of the compressed material was not evaluated in any way.

Goodman-Malamuth (1957) investigated the possible effects of speaking rate upon the understanding of heard materials of various levels of measured difficulty. A total of 487 tenth grade sighted students participated as subjects. It was the purpose of the study to determine the effects of various presentation rates upon listening when the total data for all seven levels of difficulty were combined; the effect of any particular rate on one or more individual language samples; any indication of an optimal rate of oral presentation; and correspondence between predicted readability and measured listenability, at the various rates. Seven language samples graded for readability were recorded on tape at each of four rates, namely 125, 150, 175, and 200 words per minute. The seven language samples were presented at one of four rates to four subject groups. For the 150, 175, and 200 word per minute rate, listening scores decreased as the rate of presentation increased. As the oral presentation rate was decreased from 150 to 125 words, however, listening scores again decreased. It appeared that listening scores were adversely affected by rates that were either too rapid or too slow. The 150 word per minute presentation was significantly better than the 125 word per minute rate at all levels of language difficulty. Data indicated that an optimal rate of oral presentation would probably fall between 145 and 160 words per minute.

In an investigation into the relationship of listening comprehension and rate of speech, Diehl, White, and Burk (1959) altered only the pause time. A 14-minute informative type lecture about birds was recorded at a 145 word per minute rate. The minimum pause was set at one-third of a second; this represented 2.5 inches of tape at a tape recording rate of 7.5 inches per second. Pause time was arbitrarily altered in four ways. Two faster rates were obtained by removing 50 percent and 75 percent of pause time; two slower rates were obtained by adding 50 percent and 75 percent of pause time. A total of 181 pause changes were made in each tape; tapes A, B, C, and D had a word per minute rate of 172, 160, 135, and 126, respectively. Tape E retained the original 145 word per minute rate. The 371 students who formed the four experimental groups (A, B, C, and D) and the one control group (E) were enrolled in two liberal arts colleges and one university in Kentucky. The majority of the subjects were second semester students. Each of the five groups listened to one of the five tapes, which varied only in rate. A two-part test was administered immediately after each recording was heard. Part I of the test was a 49 question completion test based on the lecture; Part II was a five-point-interval scale, for rating reactions to the speaker's delivery. The mean comprehension scores of the groups ranged from 26.04 to 28.57. An analysis of variance yielded an F-ratio of 1.07 which was not significant. The results indicated that the altered listening rates which ranged from 126 to 172 words per minute did not interfere with comprehension. The delivery on all five recordings was rated between good and very good; the scale values ranged from 1.5 to 1.8.

Enc and Stolurow (1960) attempted to establish whether, within limits, speeded rates were more efficient for learning when blind children were the learners. The investigators attempted to study the factor known in the psychology of learning as temporal contiguity. It was their intention to test the theory's claim that experiences were better associated if they had occurred close together in time. An optimum or best rate for listening would be one fast enough to keep the meanings closely associated, but not so rapid that the listener would fail to comprehend what he had heard. Enc and Stolurow maintained that when the speaker recorded at a faster rate, the material was compressed in time. Increased temporal contiguity of the experience, elicited by the orally presented material, was obtained. Two problems were investigated: (1) the utility of temporal contiguity in relation to learning by listening and, (2) whether different materials produced comparable changes in learning with changes in word per minute rate. The totally blind subjects included 10 boys and 13 girls in grades seven to ten at a braille and sight saving school. The I.Q. range, measured by the Hayes-Binet, was 89-144; the chronological ages ranged from 13.5 to 17.6 years. Each of ten stories selected from Book Two Better Reading Books, published by Science Research Associates, was recorded at a slow (174 w.p.m.) and at a speeded rate

(211 w.p.m.). The stories were edited for students with seventh or eighth grade reading ability. Each story was accompanied by a tape recorded twenty question, multiple-choice comprehension test. The subjects were divided into three groups. Groups I and II alternated in hearing the fast or slow version of an identical story which was changed on each of ten days. In order to account for any previous acquaintance with the stories, Group III heard no stories. All three groups were tested immediately, and again, twenty-four hours after listening. The findings showed that for 9 out of 10 stories the mean was higher for the faster version than for the slower version at the .01 level. The average means were 4.5 and 3.7 correct answers per listening minute, for the fast and slow versions, respectively. For 13 out of 14 children the means based on the fast versions were significantly higher than the means for the slow version. The sign-test exceeded the .001 level. The pattern of results on retest after 24 hours was the same as for the original immediate test. The investigators concluded that the study supported the temporal contiguity theory and its application to blind children, and that type of material must be considered in the selection of an optimum word per minute rate. Any conclusions drawn from this study would have to keep certain cautions in mind: (1) the study was limited to only 23 subjects, (2) although

the students were in grades seven to ten, the stories employed were edited for students with seventh or eighth grade reading ability, (3) the comprehension differences may, or may not, have been due to temporal contiguity. Many other factors could have contributed to the difference.

Blind children participated in a study conducted by Foulke, Amster, Nolan, and Bixler (1962). The study proposed to measure comprehension as a function of word rate and of the kind of material heard, and to compare the results with those obtained when the same material was read in braille. Two hundred and ninety-one sixth, seventh, and eighth grade braille readers, from eleven residential schools for the blind, served as subjects; the group included both boys and girls. "The Yellow Turtle-neck Sweater," a 2105 word fictional story was chosen as the literary selection, and "Your Blood Transports Materials," which contained 2094 words, was designated as the scientific selection. The materials were chosen from two seventh grade books that were not yet available in braille; both selections were at the fifth to sixth grade level of readability. The two selections were presented to the students in braille and at the following auditory rates: 175, 225, 275, and 325 words per minute. The subjects from the 11 schools were distributed randomly among seven groups numbering approximately 40 to 42 students per group. One group was tested for comprehension of the materials without having been exposed to them. A second group read the literary and scientific selections in braille; each of four separate groups was presented with the literary and scientific selections at one of the following auditory rates: 175, 225, 275, and 325. The seventh group heard the literary material only, at a rate of 375 words per minute. Each group listened to materials at one speed only; the scientific and literary selections were presented on consecutive days. A 36 item, multiple-choice test was administered after each of the two selections. The findings showed F-ratios of 20.07 between modes of presentation, 156.06 between types of material, and 17.49 for interaction of modes of presentation x material. All three F-ratios were significant beyond the .01 level. Since this analysis included the braille scores, the t ratios for differences between means offered a better basis for comparison with the present study. The t ratio for differences between literary comprehension scores at 175 words and those at 225 and 275 words per minute were .69 and 1.11 respectively. These differences were not significant at the .05 level. Those subjects who listened at 325 and 375 words per minute comprehended significantly less than those who listened at the 175 to 275 word per minute rate. The t ratios for differences between scientific listening comprehension scores at 175 words per minute and those at 225 and 275 words per minute were .98 and 1.15, respectively. These differences were not significant at the .05 level. The subjects who listened at 325 words per minute comprehended significantly less at the .01 level than those who listened at 175 words (_t_ ratio 2.88), but not significantly less than those who listened at 225 (_t_ ratio 1.89) or 275 (_t_ ratio 1.93) words per minute. The comprehension of material presented at 275 words per minute was nearly as good as the comprehension of material presented in braille, or at an oral rate of 175 words per minute. Results of the braille presentation were omitted because they were not pertinent to the present investigation.

In a study of cerebral palsied and other crippled children, Wietse de Hoop (1965) examined the initial learning which took place in a fixed amount of time when listening materials were presented at rates of 275 and 175 words per minute. The 168 subjects were participants in one of ten day camp programs for crippled children; the subjects represented all areas of the state of Tennessee. Sixty-three of the subjects were cerebral palsied youths (C.P.'s) whose I.Q.'s ranged from 50-123 with a mean I.Q. of 79. Their ages ranged from 7-0 to 25-0 with a mean age of 15-4. The 105 non-cerebral palsied subjects (non-C.P.'s) had other crippling and chronic health problems. They had an I.Q. range of 50-125 with a mean I.Q. of 89. Their ages ranged from 7-7 to 27-5 with a mean age of 13-7 years. The subjects were randomly assigned to one of three treatment groups. One group listened at the 175 word per minute rate, the second group at 275; the third group formed a control group which did not hear the recorded story. A 20 item multiple-choice test preceded and immediately followed an auditory presentation of the story, "Tiny Terrors of the Jungles," whose readability level was at grade five as determined by the Dale-Chall formula. This treatment story lasted 141 seconds and 90 seconds at the 175 and 275 word rates, respectively. The total listening time for both groups was 6 minutes so that the story was repeated about 2 1/3 times for the 175 word rate group, and 4 times for the 275 word per minute group. A two-way analysis of variance was computed. An _F_-ratio of 3.09 was not significant at the .05 level for listening differences between the CP and non-CP groups. A _t_ ratio (3.26) showed a significant difference at the .05 level between the two listening rates. The difference favored the 175 word per minute rate. A significant interaction demanded further _t_ tests. At the 175 wpm rate the non-CP group achieved a mean score which was significantly higher at the .05 level than the CP score (_t_ ratio 2.21). At the 275 wpm rate there were no significant differences between CP and non-CP subjects. In comparison to the non-CP subjects, the CP subjects did much better on the 275 than on the 175 wpm rate. Although the non-CP subjects were higher on the 175 wpm rate, this difference between the two subject groups was practically nonexistent at the 275 word rate. The investigator had no explanation to offer and concluded that until research has proved otherwise, the 175 wpm rate would appear to be superior to the 275 wpm rate for both the cerebral palsied, and other crippled children.

## Listening Ability and Types of Listening Material

Lowenfeld (1945), an educator and author well known in the field of the blind, conducted a series of two experiments designed to compare the speed and comprehension of braille reading with that of Talking Book reading. Series II of the study included a comparison of comprehension on each of two types of material, namely, story-telling passages and textbook passages. The subjects included 109 sixth grade and 112 seventh grade blind students from twelve residential schools for the blind. The mean I.Q. for the sixth grade was 102.4, and for the seventh grade 104.8; the distribution of I.Q.'s was available for only 173 of the 221 pupils. These scores were based on the Hayes-Binet Intelligence Test, or the Kuhlmann-Anderson Intelligence Test. The experimental materials included twelve passages and twelve multiple-choice type tests from Books IV and V of Standard Test Lessons in Reading. Six of the tests were administered in braille and six in recorded form. Three of these six passages in each mode of presentation were of the narrative type, and three passages presented informational, textbook material. The data relevant to the present investigation showed that the scores for the narrative tests were consistently higher than those for the textbook tests in both braille and Talking Book reading. The sixth grade achieved a narrative mean listening score of 23.65, and an informational listening mean of 21.08; the seventh grade had a narrative mean of 24.91 and a mean informational listening score of 22.41. The correlation between listening comprehension and 81 available I.Q. scores for the sixth grade was +.53; for the seventh grade, with 92 available I.Q. scores, the correlation was +.55.

Hannah (1961) investigated a thesis which maintained that only if the listener made sufficient abstraction of the author's message was there a valid process of oral communication of literature. Eighty-six sighted freshmen English students at one university participated as subjects. The investigation consisted of eight reading and listening situations for four groups of freshmen. The literature communicated to these groups consisted of narrative and descriptive discourses, taken from anthologies of college literature. Alternately, the students read silently, or listened to a skilled oral reading of the literary selections. Immediately after reading or hearing the selections, the students completed each of four multiple-choice tests. With a maximum score set at ten for each of the four tests, the listening groups earned a descriptive mean score of 7.67, the silent reading score was 8.06. A t ratio computed on this difference of .39 was not significant. The mean scores for the narrative tests were 7.82 for the listening groups and 7.33 for the silent reading groups. This .49 difference between means was significant at the .05 level according to t-test computation. The investigator indicated that an interpretation of her findings demonstrated that the equally effective communicatee, listener or reader, abstracted from the author's message, made a critical evaluation of the author's abstractions, and was aware of the author's inferences and evaluations. The findings which were pertinent to the present study were the narrative (7.82) and descriptive (7.67) scores of the listening groups. A mean difference of .15 indicated that the type of material, descriptive or narrative, was not a significant variable in the listening ability scores of the college freshmen in this study.

Sixth, seventh, and eighth grade blind children participated in an investigation conducted by Foulke, Amster, Nolan, and Bixler (1962). The experimental study was described in the present section (p. 26) under a review of research studies which investigated the relationship between listening ability and rate of oral presentation. Two types of listening material were presented: a literary selection, "The Yellow Turtle-neck Sweater," and a scientific selection, "Your Blood Transports Materials." Practice effects were controlled by the order in which the subjects encountered the literary and scientific materials; one-half of each subject group encountered the scientific material first, and one-half encountered the literary material first. The literary mean listening scores were 25.80, 24.74, 24.21, and 18.74 for rates of 175, 225, 275, and 325 words per minute, respectively. The scientific mean listening scores were 20.12, 18.69, 18.55, and 16.17 for rates of 175, 225, 275, and 325 words per minute, respectively. Results of an analysis of variance showed a F-ratio of 6.76 for differences in comprehension of the two types of material used in the experiment. The difference, which favored the literary selection, was significant beyond the value required at the .01 level. There was no significant difference in comprehension of literary material by those students who listened at rates through 225 words per minute ($t=1.98$) and those students who read the literary material in braille. Comprehension of the literary material heard at 275 ($t=2.49$), and 325 words per minute ($t=6.57$), was significantly poorer, at the .05 and .01 levels, respectively, than comprehension of the brailled literary selection. Comprehension of the scientific selection at rates through 275 words per minute was not significantly poorer than comprehension of the same material (t=.87) by the braille readers. Comprehension at the 325 word per minute rate was significantly poorer (t=2.58) than comprehension of the same scientific selection in braille.

### Listening Ability and Intelligence

In an experimental study of the improvement in listening ability at the college level, Erickson (1954) investigated the effects of training in listening on the correlation of listening with other factors, such as reading, vocabulary, and intelligence. Six experimental and six control classes of freshmen communication students from two colleges participated. There were 160 subjects in the experimental, and an equal number in the control group. The experimental classes were given one lecture on how to listen and 18 training exercises in listening. Fifteen lessons in listening training were taken from McCall-Crabbs Test Lessons in Reading and three exercises were taken from Brown's Efficient Reading. The experimental and control groups were given the same instruction, with the exception of the listening training given to the experimental group. The Brown-Carlsen Listening Comprehension Test was administered to both groups at the beginning and at the end of the 12 week experimental period. The ACE Psychological Examination for College

Freshmen, 1949 Edition, was given at the beginning, and the Inglis Vocabulary Test, Form A was administered during the seventh week of the term. The findings pertinent to listening ability and intelligence showed that the correlation of intelligence with the initial listening score of the experimental group was .69; the correlation with the final listening score for the same group was .77. The author concluded that these results showed that training in listening had raised the correlation coefficient score. A comparison of the mean differences between initial and final listening scores of the control group (4.84), and that of the experimental group (5.95), showed that although the experimental classes had achieved a greater gain, the control group had also improved significantly in listening.

Stromer (1954) investigated the relations between reading, listening, and intelligence, and the effect of training on reading and listening ability. Twenty-four sighted college students participated in the experiment. To compare the effects of training, the students were given listening or a combined reading-listening type of training for two hours a week for one semester quarter. The Diagnostic Reading Test was administered before and after the training period to measure listening and reading ability. In the comparison of listening scores with intelligence, only 20 students were included. The complete

Wechsler-Bellevue Intelligence Scale was administered to 10 subjects with low scores and 10 subjects with high scores on parts 1b and 3 of various forms of the Diagnostic Reading Test. Ratios of significance were computed for each test and subtest of the intelligence scale for the two listening groups. Poor listeners were defined as those who ranked below the 15th percentile, and good listeners as those who ranked above the 85th percentile. The good listeners had significantly higher mean scores on the following aspects of the Wechsler-Bellevue Intelligence Scale: Full Scale, total verbal, total performance, information, vocabulary, similarities, arithmetic, picture completion, and block design. The mean difference between the two groups of listeners on the Full Scale was 11.4, on the verbal 8.5, and on the performance 15.0. There were no significant differences between the good and poor listeners on the comprehension scale, digit span, picture arrangement, object assembly, and digit symbol.

In a study which investigated the improvement of the listening ability of sighted intermediate grade school children, Hollow (1955) examined the relationship of listening comprehension and intelligence. One hundred pupils in the experimental group were paired with reference to age, intelligence, and initial listening comprehension scores with 100 pupils in a control group. The mean I.Q. of the experimental group was 109.70 and that of the control was 109.66. Two forms of a 63 item multiple-choice test were constructed by the investigator; each form included sixteen selections, four narrative, five expository, and seven descriptive selections. Intelligence quotients were obtained from the administration of the California Short-Form Test of Mental Maturity, Grades 4-8; the California Achievement Test, Form DD was used to measure achievement. Three textbooks, Using Our Language, Grade 5, Discovering Our World, Book 2, Misericordia Readers, Fifth Reader and thirty lesson plans were used by each experimental teacher. Sixteen participating teachers gave alternate forms of the listening test to both the control and experimental groups one week before the experimental teaching began. The achievement and intelligence tests were administered during the same week. For six weeks, daily twenty minute lessons in listening comprehension were taught by the teachers in the eight participating schools. The alternate form of the listening test was administered to both groups, control and experimental, at the termination of the instruction period. The final mean listening test score for the experimental group was 43.31; the score of the control group was 33.14. A t ratio of 14.53 was significant at the .01 level; the findings warranted the conclusion that listening skill had been improved by instruction in listening. In order to determine which intelligence level benefited most from the listening instruction, the experimental group of 100 pupils was divided into quarters on the basis of intelligence quotients. Although the greatest gains were achieved by children whose I.Q.'s ranged from 102-110 (11.72 gain), and more than half of the listening gains (54.73%) made by the total experimental group were contributed by the pupils whose I.Q.'s fell within the 70-110 interval, the relative listening positions of the four quarter I.Q. groups remained unchanged before and after listening instruction. Positive correlations ranging from +.33 to +.56 were significant at the .01 level and indicated that listening was related to the following factors: reading, spelling, total language, arithmetic, and intelligence. The correlation between listening and intelligence was +.42.

Kramar (1955) proposed to provide evidence as to the relationship between intelligence and listening skill. The Brown-Carlsen Listening Comprehension Test, the Wechsler-Bellevue Intelligence Scale, and the American Council on Education Psychological Examination (ACE) were the materials used in measurement. The 196 randomly selected sighted college students, both men and women, represented one-sixth of the enrolled population for the fall and spring semester speech classes at a southern state university. The Wechsler test was administered at the beginning of the experiment and the ACE was given in the Fall term. During the final examination week, the listening test was administered by an instructor who read the test aloud. The mean scores were: Brown Carlsen Listening test 55.88, the full scale Wechsler-Bellevue 113.53, and ACE 100.69. The correlations between listening and the Wechsler test were +.54 for verbal, +.37 for performance, and +.54 for total. Between listening and the ACE, the correlations were +.43 for qualitative, +.52 for linquistic, and +.55 for the total score. Kramar concluded that a moderate relationship existed between intelligence and listening ability.

Hampleman (1958) made a comparison of listening and reading comprehension as this relationship was affected by several factors, including difficulty of material and mental age. Three hundred eight sighted children in the fourth and sixth grades of eight elementary schools were randomly divided into two groups. The tests employed in the study were the California Test of Mental Maturity, Non-Language Section; ten passages from the paragraph comprehension section of the Durrell-Sullivan Reading Achievement Test Form A; and story material from Beal's Buffalo Bill. One experimental group listened to a 145 to 150 word per minute reading of the Durrell-Sullivan reading passages; the other experimental group was allowed an equal amount of time to read the same materials. The same procedure was followed with five passages of varying length, from Buffalo Bill. A multiple-choice test followed each listening or reading session. The statistical measures employed were analysis of variance and covariance. Hampleman found that listening comprehension was significantly superior to reading comprehension at the .01 level for fourth and sixth grade pupils. As was to be expected, easy material was more readily comprehended than hard material; listening showed a greater superiority over reading comprehension with easy material, than with difficult material. An increase in mental age decreased the difference between listening and reading comprehension. Hampleman recommended that more attention be given to oral presentation of subject matter with elementary school children, especially those with lower mental ages.

A study made in Brazil by Biggins (1961) included a comparison of listening comprehension with mental ages, sex, and cultural background. The subjects included 124 second grade, and 130 third grade sighted public school children. Each subject was given the California Achievement Test, the California Test of Mental Maturity, and the Evan L. Wright Listening Test, which was not standardized. The second graders had a mean age of 7 years, 8 months and a mean intelligence score of 99.5; the third graders had a mean age of 8 years, 5 months and a mean intelligence score of 103.4. The listening test scores covered a range from 20 to 74 with a mean of 46.5 for the second grade; for the third grade the range was from 30 to 90 with a mean of 62.9.

The correlation in second and third grades, respectively, between listening and mental age was +.69 and .75. From her findings, Biggins concluded that listening ability had a strong relationship with intelligence. Neither sex showed superiority in listening at the primary level.

In an investigation of the interrelationships of reading, listening, arithmetic computation, and intelligence, Cleland and Toussaint (1962) tested 172 sighted pupils enrolled in nine intermediate classes of nine schools. There were 50, 64, and 58 pupils in grades four, five, and six, respectively. The SRA Primary Mental Abilities Form AH and the Stanford-Binet Intelligence Scale Form L-M were used to measure intelligence; the Durrell-Sullivan Reading Capacity Test and the STEP Listening Test Form 4A were employed to measure listening ability. The subjects also took the Gates Reading Survey Form 2 and the American School Achievement Form G, Part II Arithmetic Computation. The mean intelligence quotients on the Stanford-Binet were 111.76 for the fourth grade, 107.68 for the fifth, and 105.57 for the sixth grade. Pearson product-moment correlations showed that the STEP test related more closely with intelligence than the Durrell. The two listening tests had many factors in common, however, and the correlation between them was +.7030, with significance at the .01 level. The correlation between STEP listening and the SRA primary abilities test was +.6349. Cleland

and Toussaint concluded that a positive correlation existed between intelligence and listening.

Hartlage's (1963) comparison of the listening ability of blind and sighted high school students was the first research study described in this section (p. 15). In that investigation, Hartlage noted a rather high correlation between intelligence and listening. He computed rank order correlations of Otis' Intelligence scores with listening ability at +.79 for the blind and at +.66 for the sighted group.

Summary

A survey of related listening research was presented in this section under the four variables of sightedness, rate of oral presentation, types of listening material, and intelligence. No available research studies investigated the relationship between listening ability and the types of schools attended by blind students.

Only one study made a comparison of the listening comprehension of blind and sighted students. A standardized test was not used and the measurement of listening ability was limited to the comprehension of one literary selection. The investigator directed attention to the fact that the test did not provide adequate ceiling for the better students. Sightedness was not found to be a significant variable in the area of listening ability among the high school students tested.

Ten studies were reviewed which investigated the effect of oral presentation rate on listening comprehension. The delivery rates varied considerably from one study to another, but in general, about half of the studies reported that, within limits, listening ability decreased as the rate of delivery increased. As rate decreased below 150 words per minute, listening comprehension again decreased. Three studies which included blind subjects of junior and senior high school age favored accelerated rates. One was an opinion questionnaire; the other two studies reported that a speeded oral rate increased listening comprehension; the highest acceptable speeds varied from 211 to 325 words per minute.

Very few studies investigated the relationship between listening comprehension and the types of material heard. Two experiments with blind students in the upper elementary grades were conducted by different investigators separated in time by 17 years. Both studies revealed a difference in listening comprehension due to type of material. The earlier study reported higher scores in narrative than in textbook material; the more recent study showed a significant difference in favor of literary over scientific material. At the college level, a study with sighted subjects indicated that narrative and descriptive types of listening material were not a significant variable. The results of each of these studies were obtained from data on only two types of listening material. In one study the material was too broadly defined to justify specific conclusions with respect to the effect of a particular type of material on listening comprehension. In fairness to the investigators, it must be stated that although all three did investigate this variable, their experiments were not concerned, primarily, with the relationship between types of material and listening comprehension.

Many studies investigated the correlation between listening and intelligence; all of the reviewed research showed positive correlations. The three investigations with students at the college level reported a correlation of +.54 with the Wechsler-Bellevue test, and correlations which ranged from +.55 to +.69 between the ACE intelligence test and initial listening tests. At the high school level, the correlation between the Otis intelligence scores and listening was +.79 for the blind students and +.66 for the sighted. Among the elementary school students, the correlation between the SRA Primary Mental Abilities test and Stanford-Binet and listening was +.63; the correlations ranged from +.42 to +.75 with the California Short Form Test of Mental Maturity.

## SECTION III

## The Subjects, Materials, and Procedure

The aim of this investigation was to make a comparison of the listening ability of blind and sighted children in the intermediate grades of the elementary school, as this listening ability was affected by such factors as sightedness, oral communication rate, intelligence level, kinds of listening material, and type of school program attended by the blind students.

The purposes of this section were fourfold: (a) to describe the subjects who participated in the investigation, (b) to discuss the materials which were used, (c) to explain the procedures which were followed and, (d) to indicate the statistical designs which were employed in the analysis of the data obtained.

### The Subjects

The total sample of 304 subjects included an equal number of blind and of sighted pupils, of both sexes, in the intermediate grades of the elementary school. The complete sample of blind and sighted subjects was drawn from a total of 61 schools. Eight of the 61 schools contributed subjects to both the blind and the sighted groups. The areas in which the schools were located included the counties of Kings, Queens, Bronx, New York, Nassau, Suffolk, and Westchester in New York, and Bergen, Essex, Hudson, and Union in New Jersey. The county of

Richmond was excluded because there was no educational program for totally blind children on Staten Island; the blind residents attended schools in other counties.

Only legally blind braille readers were accepted as candidates for the blind sample; legally blind students who read large print, or who read braille and large print, were not included in this investigation. The blind subjects represented a total of 43 schools. This number included 30 public schools, 10 parochial schools, and all three of the special schools for the blind in New York State. One special school for the blind, although not located in the New York Metropolitan Area, was included to insure a representative sampling of the special schools for the blind, and to equate the number of subjects from the special schools with those of the integrated programs. There were fewer parochial schools because the integrated program existed in a limited number of these schools. Every parochial school in the New York City area which had qualified blind students registered in an integrated program participated in this investigation.

The original group of blind subjects consisted of 177 students. Of this number, three were disqualified because of absence during the administration of one of the tests; the scores of an additional 22 subjects were randomly eliminated, in order to equate the groups according to the statistical requirements of the investigation. These eliminations reduced the total number of blind subjects to 152. Of this number, 76 students attended special schools for the blind, and 76 students attended integrated programs. Each of the blind subjects from the integrated programs was enrolled in a school primarily established for sighted children. Those subjects who were enrolled under the resource room program received whatever individual tutoring or special group instruction they required from a qualified teacher of the blind in a specially equipped resource room. The visually handicapped children were transported to certain centrally located schools in which such resource rooms had been established. The blind subjects who were educated under the itinerant teacher program, were enrolled in the regular classes of their local schools, and received whatever specialized instruction or services they required, from an itinerant teacher qualified to teach the visually handicapped. The itinerant teacher traveled from one local school to another to instruct the individual blind child in each, on certain prearranged days every week. The subjects from the special schools for the blind were students in institutes devoted solely to the education of the handicapped. The subjects were enrolled in their particular grades and received all their instruction from teachers qualified to teach the visually handicapped. The classrooms and libraries were furnished with specialized equipment used in the education of the blind.

The sighted subjects represented a total of 26 schools; this number included 21 public schools and 5 parochial schools. An equal number of subjects represented the public and the parochial schools. The schools were chosen to include students from the same geographic areas which the blind students represented. The original group of sighted students consisted of 185 subjects; of these 14 were disqualified because of absence from one of the testing sessions. Two students were eliminated from the study because of hearing deficiencies. The hearing deficiencies, within the speech frequency range, were noted during the audiometric screening conducted during the investigation. After the scores of 17 additional subjects were randomly withdrawn to accomodate the statistical design of the investigation, a final sample of 152 sighted subjects was retained. The statistical design required that the total cell frequencies for each of the groups be equal. The distribution of subjects according to sightedness, school, and order was presented in Table 1.

Table 1

Distribution of Subjects According to Sightedness, School, and Order

| Order | Blind<br>Special | <br>Integrated | Sighted<br>Public | <br>Parochial | Totals |
|---|---|---|---|---|---|
| One | 38 | 38 | 40 | 36 | 152 |
| Two | 38 | 38 | 36 | 40 | 152 |
| Totals | 76 | 76 | 76 | 76 | 304 |

The Materials

The materials employed in this investigation were a Model 53 Audiometer, two forms of a standardized test of listening recorded on four tapes, and a Wollensak tape recorder. The listening material was recorded on tape, at the two rates of 175 and 225 words per minute, by an experienced and approved reader employed by Recording for the Blind, Inc., New York.

The intelligence scores of the sighted and the blind subjects were obtained from their respective schools; these scores were employed in classifying the subjects in three ability levels according to standard scores. The levels compared closely with those employed by Rowe (1963, p. 94). Individual assessment of the intelligence of blind subjects by means of the Interim Hayes-Binet and the Wechsler Intelligence Scale for Children had been found satisfactory, but group intelligence tests had not proved reliable for use with the blind (Davis, 1962; Pearson, 1963). Classification similar to that which was employed in this investigation was approved by Nolan:

> In spite of validity problems, adaptations of intelligence tests have played an important role in the education of blind children over the last four decades. Use of such tests makes possible a reliable ranking of blind children, from high to low, along an intellectual continuum. Norms relative to this particular group have been roughly determined and, in the case of the Wechsler scales, a direct comparison with the performance of seeing groups can be made (Nolan, 1963b, p. 132).

Individual intelligence testing of the sighted subjects would have been prohibitively time consuming and expensive, and could not be expected to make any contribution, which would significantly affect the broad ability level classification, based on scores from the group tests.

Sequential Tests of Educational Progress: Listening. The Sequential Tests of Educational Progress, published in 1957, included listening tests at four levels intended for students at the elementary, junior high school, senior high school, and college levels; each level provided equivalent forms. Forms 4A and 4B of level four, which was constructed for the fourth, fifth, and sixth grades of the elementary school, were employed in this investigation. Each of these forms consisted of 13 listening selections, and an 80-item, four alternative multiple-choice type test. Both forms were administered to every candidate so that he heard a total of 26 selections and responded to a total of 160 questions. The

STEP tests were selected because: (a) they were standardized for the grades being investigated, (b) they provided equivalent forms, (c) they presented listening passages which included various types of listening material, (d) they provided adequate ceiling for the superior student and adequate floor for the poorer student, and (e) they were appropriate for the design employed in the investigation.

In equating the final forms of the STEP series, two broad types of equating were employed by Educational Testing Service: (a) horizontal, which adjusted for random differences in difficulty between alternate forms at the same level and, (b) vertical, which adjusted for the differences among the four levels. Raw scores, which indicated the total number of correct answers could not be directly compared from one level to another, since the levels varied in difficulty. Vertical equating permitted the use of a single score reporting scale for all levels of each test. A score of 230 was assigned to a raw score midway between a maximum score and a "chance" score on level four.

Participants in the norming program for listening, exclusive of the college level, represented 36 states in the United States. A special sample of 1000 students per grade from four through 12 was selected. Each student was tested with SCAT and with the appropriate level of the listening test. At the fourth, fifth, and sixth grade levels, correlations of STEP listening with SCAT-Verbal were .65, .75, and .72; with SCAT-Quantitative .49, .65, and .64; with SCAT-Total .66, .74, and .74, respectively.

The reliabilities for the STEP tests were the results of internal analyses based on a single administration of the tests; only the A forms of the tests were analyzed. The reliability of Form 4A, Grade 5, as estimated from the Kuder-Richardson Formula 20 was .93; the raw score mean was 54.78, and the standard deviation was 13.45.

Data by sex for the norms groups showed similar performance for boys and girls throughout the range of grades four through 12.

Lindquist (in Buros, 1959) reported that the auxiliary materials and the directions for the administration and scoring of the tests were competent and well done. However, he found fault with the norming procedure because the norms for all levels were not based on the same school system, and the schools used in the standardization of the listening tests were different from those used for the other tests in the STEP battery. He disapproved of the norms of the Brown-Carlsen listening test also: "The norming procedures for the B-C test are no more satisfactory than for the STEP Listening" (in Buros, 1959, p.651). Lorge (in Buros, 1959, p. 655), however, considered the STEP listening tests well normed and adequately item analyzed.

Lorge and Lindquist (in Buros, 1959) believed that uncontrolled oral rate, and varied emphasis, enunciation, phrasing, and pausing, from one examiner to another, could affect the performance of individual candidates and the reliability and validity of the tests. Lorge suggested that the use of a test booklet and a separate answer sheet was redundant and also made the task a joint reading and listening one. These last objections were not applicable to the present investigation since the design and procedure employed in the experiment controlled all these factors of voice, and oral rate, and eliminated the reading stimulus.

The Procedure. The initial step in the procedure was the selection of an adequate and representative sampling of blind and sighted subjects in the intermediate grades. The sighted sampling presented no problem, but blind children in the New York Metropolitan Area, and elsewhere, had been participating in local educational programs in both public and parochial schools, as well as in special schools established exclusively for the education of the blind. Since blind children in the local integrated programs had not been included in any of the reviewed research in listening, it was believed that an investigation which included such students would be a contribution to research, and would, furthermore, insure and enhance the representativeness of the blind sample.

Requests for permission to conduct the research investigation were granted by the Division of Child Welfare and the Bureau of Educational Research of New York, the supervisors of the visually handicapped programs, and the superintendents of the various school districts involved. After the preliminary permissions were granted, the supervisors of the programs for the visually handicapped identified the schools which had resource room classes, or individual blind children registered under the itinerant program. The principals of all the schools, public, parochial, and special schools for the blind, were contacted and acquainted with the purpose and plan of the proposed study. The investigator personally consulted each principal and itinerant teacher in order to accomodate the testing periods to the convenience of the school, the pupil, the classroom teacher, and the itinerant or resource room teacher. Necessary adjustments were made and the testing schedule was completed.

The principals were requested to select the necessary number of sighted students from the fourth, fifth, and sixth grades by choosing every fifth name from an alphabetical list of all the pupils in each participating grade. They were asked to exclude those students whose intelligence quotients were more than one standard deviation below the mean. To insure an adequate sampling, all legally blind braille readers in the intermediate grades of the cooperating schools were selected for testing, except those students whose intelligence quotients were more than one standard deviation below the mean. One school limited participation to five students because of other school activities.

The next step in the procedure was the administration of the listening tests. The Sequential Tests of Educational Progress: Listening, Forms 4A and 4B were used for all the subjects in the study. Each of the two forms of the test had been recorded on tape at speeds of 175 and 225 words per minute. The testing periods had been arranged so that each subject took either form and speed of the listening test on his first test day and the alternate form at the alternate speed on the following day. The tests were administered so that ½ of the blind and ½ of the sighted subjects took Form 4A at the first session at the speeded rate and ½ took it at the non-speeded or regular rate. At the second administration these subjects took Form 4B at the alternate rate. The procedure was reversed with the other half of the subjects, so that ½ took Form 4B at the first session at the speeded rate and ½ took it at the regular rate. At the second administration these subjects took Form 4A at the alternate rate. The distribution of subjects for the initial testing session was presented in Table 2.

## Table 2

## Distribution of Subjects for the Initial Testing Session

| Subjects | Order One |  | Total | Order Two |  | Total | TT |
|---|---|---|---|---|---|---|---|
|  | 4AR | 4BR |  | 4AS | 4BS |  |  |
| Blind | 38 | 38 | 76 | 38 | 38 | 76 | 152 |
| Sighted | 38 | 38 | 76 | 38 | 38 | 76 | 152 |
| Total | 76 | 76 | 152 | 76 | 76 | 152 | 304 |

4AR = Form 4A at regular speed
4BR = Form 4B at regular speed
4AS = Form 4A at accelerated speed
4BS = Form 4B at accelerated speed

The tests were administered in each school in a classroom or other room designated by the individual principal. In the integrated program the test was most frequently administered in the resource room, or in the room where the itinerant teacher regularly instructed the blind child. The directions for each test were first given orally by the investigator and then repeated by the reader on the tape recording. This was done so that the children would fully understand the directions, be at ease, and become familiar with the reader's voice and oral rate before the actual test materials were presented. None of the subjects used test booklets containing the suggested answers. The use of such booklets would have introduced an unwelcome reading variable, and the braille copy of such a booklet, in addition to the braille answer sheets, would have been cumbersome and difficult for the subjects to handle. The sighted children used the printed answer sheets provided by the Educational Testing Service; the blind children used the same type of answer sheet in a brailled form prepared by the investigator. Both the sighted and the blind subjects used pencils to indicate their preferred answers. The directions for the test were given orally exactly as they were printed in the Directions for Administering and Scoring, (pp. 4-6), except that (a) allusions to the test booklet were omitted and, (b) the sentence directing the subjects to erase the first mark completely when they wished to change an answer was amended for the blind subjects. These subjects were told: "If you change your mind about an answer, raise your hand, and we will erase the first mark for you." At each testing session, a five minute recess was given between Part One and Part Two.

The scoring of the print and the braille answer sheets was performed by the investigator. The raw scores were changed to converted scores according to the procedure described in Directions for Administering and Scoring (p. 20). The raw scores and the converted scores were recorded. The last step in the testing procedure consisted of a hearing check. Each child's hearing was screened for deficiencies at pure tone frequencies, below, through, and above the speech frequency range. This was accomplished through use of the Model 53 Audiometer according to the procedure described in the manual (p. 6). The investigator practiced the screening method and tested forty children under the supervision of a registered nurse before testing the subjects in the investigation. The audiometer test was scheduled to follow the administration of the second listening test to avoid the creation of any tension in the subjects.

## The Statistical Procedure

A three-way classification analysis of variance with repeated measures was employed (a) to test the significance of the mean differences in listening ability for the total group, between the blind and the sighted subjects, between the speeded and regular auditory rates, between Order One and Order Two and, (b) to test the significance of the interactions between sightedness and order, between speededness and order, between sightedness and speededness, and the triple interaction of sightedness, order, and speededness.

The sums of squares, mean squares, and the F-ratios of the three variables of sightedness, speededness, and order, and their various interactions, were computed according to the design presented in Table 3 and described by Lindquist (1953, p. 284). This design was appropriate for making maximum use of the available data, and for the achievement of the purposes of the investigation. Use of the Type III design made possible a comparison of between-subject differences, and of within-subject differences. The effects of blindness or sightedness, and the order in which the subjects took the tests at the regular and at the speeded rates, were between-subject differences. Speededness was a within-subject difference. In Table 3 the letters "B," "C," and "A," were used to signify sightedness, order, and speededness, respectively.

A two-way classification analysis of variance was computed for each of the four types of listening material: expositive, narrative, directive, and aesthetic. The design computed the mean difference effects of sightedness and order as well as their interaction effects on the measured

## Table 3

## Analysis of Type III Designs

| Source | DF | Sums of Squares |
|---|---|---|
| Between-Subjects | bcn - 1 | $SS_S$ |
| B | b - 1 | $SS_B$ |
| C | c - 1 | $SS_C$ |
| BC | (b-1) (c-1) | $SS_{BC} = SS_{\overline{BC}} - SS_B - SS_C$ |
| error (b) | bc (n - 1) | $SS_{error}\ (b) = SS_{res}\ (b)$ |
| Within-Subjects | bcn (a - 1) | $SS_{WS} = SS_T - SS_S$ |
| A | a - 1 | $SS_A$ |
| AB | (a-1) (b-1) | $SS_{AB} = SS_{\overline{AB}} - SS_A - SS_B$ |
| AC | (a-1) (c-1) | $SS_{AC} = SS_{\overline{AC}} - SS_A - SS_C$ |
| ABC | (a-1) (b-1) (c-1) | $SS_{ABC} = SS_{\overline{ABC}} - SS_{AB} - SS_C - SS_{AC} - SS_{BC}$ |
| error (w) | bc (a-1) (n-1) | $SS_{error}\ (w) = SS_{res\ (w)}$ |
| Total | abcn - 1 | $SS_T$ |

listening scores of the total blind and sighted groups for each of the four types of material heard.

The Type III design was applied to the data for the three ability levels of the blind and the sighted groups. The sums of squares, mean squares, and the F-ratios of the three variables of sightedness, intelligence level, and speededness, and their various interactions were computed. The variances of sightedness and intelligence, and their interaction, were between-subject differences; the speededness factor, and its interactions, were within-subject differences. In Table 3 the letters "B," "C," and "A", corresponded here to sightedness, intelligence level, and speededness, respectively. The three-way classification analysis of variance computed to test the significance of the mean differences in listening ability at the three levels of intelligence was performed separately for Order One and Order Two. The separate analyses were made because the total group analysis of variance had indicated that the performance of the blind and that of the sighted subjects had not conformed to the same pattern within Order One and Order Two.

When the subjects were classified according to level of intelligence, the number of subjects at each intelligence level was unequal. The analysis of variance design required that the cell groups be divided proportionately. In Order One, five blind subjects to four sighted subjects, and in Order Two, four blind subjects to three sighted subjects, were the ratios selected as those which would retain the maximum number of subjects and also maintain a sufficient number in each cell to form reliable conclusions based on the findings. The elimination of subject scores was accomplished by use of the Table of Random Numbers, (Arkin and Colton, 1950, p. 142). The distribution of subjects, before and after adjustment, for Order One and Order Two, were presented in Tables 4 and 5, respectively.

The Type III design was employed again (a) to test the significance of the mean differences between the listening ability of the blind subjects in the special schools and those in the integrated programs, between Order One and Order Two, between the regular and the speeded auditory rates, and (b) to test the significance of the interaction between type of school and order, between order and speededness, between type of school and speededness, and the triple interaction of type of school, order, and speededness. The effects of type of school and order were between-subject differences; the speededness was a within-subject difference. In Table 3 the letters "B," "C," and "A," corresponded here to type of school, order, and speededness, respectively.

### Table 4

### Distribution of Subjects in Order One According to Three Ability Levels Before and After Adjustment

| Ability Level | Blind BA | Blind AA | Sighted BA | Sighted AA | Total BA | Total AA |
|---|---|---|---|---|---|---|
| High | 30 | 30 | 35 | 24 | 65 | 54 |
| Average | 30 | 30 | 29 | 24 | 59 | 54 |
| Low | 16 | 15 | 12 | 12 | 28 | 27 |
| Total | 76 | 75 | 76 | 60 | 152 | 135 |

BA = before adjustment
AA = after adjustment
Ratio = blind: sighted:: 5:4

### Table 5

### Distribution of Subjects in Order Two According to Three Ability Levels Before and After Adjustment

| Ability Level | Blind BA | Blind AA | Sighted BA | Sighted AA | Total BA | Total AA |
|---|---|---|---|---|---|---|
| High | 26 | 24 | 35 | 18 | 61 | 42 |
| Average | 34 | 32 | 32 | 24 | 66 | 56 |
| Low | 16 | 12 | 9 | 9 | 25 | 21 |
| Total | 76 | 68 | 76 | 51 | 152 | 119 |

BA = before adjustment
AA = after adjustment
Ratio = blind: sighted:: 4:3

# SECTION IV

## Analyses of the Data and Findings

The data derived from the administration of the Sequential Tests of Educational Progress: Listening, Form 4A and Form 4B were submitted to the statistical treatments described in Section Three. It was the purpose of the present section to present the findings, which resulted from the statistical procedures employed, in answer to the questions proposed at the outset of the investigation. The results were organized under the following outline:

### Total Group

Data descriptive of differences in listening test performances of the blind subjects and of the sighted subjects were presented as measured under three variables, namely,

(a) sightedness
(b) order
(c) speededness.

Data relative to sightedness were obtained from the results of the STEP Listening Tests administered to the 152 blind subjects and to the 152 sighted subjects under the same conditions of order and speededness. Data reported under Order One were derived from the results of the standardized listening test administered at the non-speeded rate in the subject's initial testing session, and from the results of the equivalent form of the test administered at the accelerated rate in the subject's second testing session. Data reported under Order Two were obtained from the results of the standardized listening test, administered at the accelerated rate in the subject's initial testing session, and from the results of the equivalent form of the test, administered at the regular or non-speeded rate in the subject's second testing session. Data relative to speededness were derived from the results of the standardized listening tests administered to the same subjects, both the blind and the sighted, under speeded (225 wpm) and non-speeded (175 wpm) recording conditions.

Type of Materials. Data descriptive of differences in listening test performances of the total group of blind subjects and of the sighted subjects were also presented as analyzed separately, for each of four types of material, namely,

(a) exposition
(b) narration
(c) direction
(d) aesthetic.

The Total Group section included treatment of the first four questions formulated in the statement of the problem.

Order One

Data descriptive of differences in listening test performances of 135 blind and sighted subjects who took the non-speeded form of the listening test first were presented as measured under three variables, namely,

(a) sightedness
(b) intelligence
(c) speededness.

The scores of 17 subjects had been randomly eliminated from the total number of subjects in Order One in order to obtain proportionate cell frequencies for each of the three ability levels.

Order Two

Data descriptive of differences in listening test performances of the 119 blind and sighted subjects who took the speeded form of the listening test first were presented as measured under three variables, namely,

(a) sightedness
(b) intelligence
(c) speededness.

The scores of 33 subjects had been randomly eliminated from the total number of subjects in Order Two in order to obtain proportionate cell frequencies for each of the three ability levels. Sections designated Order One and Order Two included treatment of the fifth, sixth, and seventh questions proposed in the statement of the problem.

Integrated Programs and Special Schools for the Blind

Data descriptive of differences in listening test performances of the blind subjects who attended integrated school programs, and of the blind subjects who attended special schools for the blind, were presented as measured under three variables, namely,

(a) type of school attended
(b) order
(c) speededness.

This section treated the eighth question formulated in the statement of the problem.

## Total Group

**Differences in Listening Ability Scores of Blind and of Sighted Groups in Speeded and Non-Speeded Administrations of the STEP Listening Tests, Forms 4A and 4B.** Two scores for each of the 304 subjects, 152 blind students and 152 sighted students, were available from the administration of Form 4A and Form 4B of the listening tests. Each student took a speeded and a non-speeded form of the test. The tests were scheduled so that the two forms were administered on two successive days. Table 2 in Section III showed the distribution of subjects according to the number tested initially with a speeded or a non-speeded recording of Form 4A or Form 4B. The same subjects were subsequently tested with an equivalent form of the test at the alternate recording speed. The total mean scores for each group, blind and sighted, achieved in Order One and Order Two were indicated in Table 6.

The first question presented in the statement of the problem asked: Was there a significant difference in the listening ability of the blind subjects, and the listening ability of the sighted subjects in this study, as determined by the STEP Listening Tests recorded at

## Table 6

### Mean Scores for Blind and Sighted Subjects According to Order of Test Administration for the Total Group on the STEP Listening Tests, Forms 4A and 4B

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 264.421 | 261.513 | 262.967 |
| Sighted | 264.322 | 267.881 | 266.101 |
| Total | 264.371 | 264.697 | 264.534 |

regular speed? At accelerated speed?

A three-way classification analysis of variance with repeated measures made it possible to test a mean difference for sightedness, an order mean difference, a speededness mean difference, an interaction difference of sightedness x order, an interaction difference of order x speededness, an interaction difference of sightedness x speededness, and an interaction difference of sightedness x order x speededness.

The results of the analysis of variance computed according to Type III mixed design (Lindquist, 1953, p. 284) were reproduced in Table 7.

An *F*-ratio of 5.296 was found for the difference between the mean listening scores of the sighted and those of the blind. This ratio was statistically significant, since it was greater than the 3.87 ratio required at the

### Table 7

### Analysis of Variance of Scores on the STEP Listening Tests, Forms 4A and 4B for the Total Group

| Source | df | Sums of Squares | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between Subjects | 303 | 87712.775 | | |
| Sightedness | 1 | 1493.765 | 1493.765 | 5.296 |
| Order | 1 | 16.120 | 16.120 | .057 |
| Sightedness X Order | 1 | 1589.291 | 1589.291 | 5.634 |
| Error (Between) | 300 | 84613.599 | 282.045 | |
| Within Subjects | 304 | 10320.500 | | |
| Speededness | 1 | 1124.883 | 1124.883 | 39.264 |
| Order X Speededness | 1 | 319.870 | 319.870 | 11.165 |
| Sightedness X Speededness | 1 | 34.580 | 34.580 | 1.207 |
| Sightedness X Order X Speededness | 1 | 246.331 | 246.331 | 8.598 |
| Error (Within) | 300 | 8594.836 | 28.649 | |

.05 level of significance. The null hypothesis of no difference was rejected; since there were only two groups, the blind and the sighted, the mean scores of the two groups were compared. The difference favored the sighted subjects whose group mean (266.101) surpassed the group mean (262.967) achieved by the blind.

An *F*-ratio of .057 indicated that no significant difference was found between the mean of the total group of blind and sighted subjects who took the non-speeded test first and the mean of the total group of blind and sighted subjects who took the speeded test first. This total group included an equal number of blind and sighted subjects.

An interaction *F*-ratio of 5.634 between order and sightedness, was significant beyond the .05 level. Inspection of the adjusted mean scores shown in Table 8 indicated that the significant interaction was due to the fact that in Order One the difference between means favored the blind, whereas in Order Two the difference between means favored the sighted group.

The *F*-ratio of 39.264 between the speeded and the non-speeded administrations of the tests was significant beyond the .01 level. The null hypothesis was rejected; it was more reasonable to assume that a real difference did exist between the mean scores achieved under the accelerated and the non-accelerated administrations. There were only two groups, regular and speeded; inspection

Table 8

Adjusted Mean Listening Scores for Interpreting Interaction: Sightedness X Order for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 266.151 | 262.917 | 264.534 |
| Sighted | 262.918 | 266.151 | 264.534 |

of the mean scores for the regular (265.894) and for the speeded (263.174) established the fact that the significant difference was in favor of the regular or non-speeded administration.

Since the significant F-ratio of 11.165, computed for the order x speededness interaction, exceeded the value necessary at the .01 level of significance, the null hypothesis was rejected. Inspection of the adjusted mean scores in Table 9 revealed that the significant interaction arose because in Order One the difference was in favor of the speeded administration whereas in Order Two the difference favored the regular or non-speeded administration. A t ratio of 2.362, computed from the mean difference between the regular and the accelerated speeds, was significant beyond the .05 level. This might well be interpreted as a practice effect since the advantage favored the second administration in each instance.

Table 9

Adjusted Mean Listening Scores for Interpreting Interaction: Order X Speededness for the Total Group

| Rate of Administration | Order One | Order Two | Total |
|---|---|---|---|
| Regular | 263.809 | 265.259 | 264.534 |
| Speeded | 265.259 | 263.808 | 264.534 |

The interaction F-ratio of 1.207 for sightedness x speededness did not exceed the ratio (3.87) required for significance at the .05 level. The null hypothesis was retained and it was assumed that the speededness factor did not operate discriminatively between the blind and the sighted subjects when their total speeded scores and their total regular scores were subjected to analysis of variance.

An F-ratio of 8.598 was found for the triple interaction variance of sightedness x order x speededness. This ratio exceeded the ratio (6.72) required for significance at the .01 level. The null hypothesis of no interaction difference was rejected. It was assumed that the F-ratio, obtained when the effect of the three factors was combined, demonstrated a difference which could not reasonably be attributed to chance. An examination of the adjusted mean scores listed in Table 10 indicated that the significant interaction arose from the fact that the achievement of the blind and that of the sighted subjects

Table 10

Adjusted Mean Listening Scores for Interpreting Interaction: Sightedness X Order X Speededness for the Total Group

| Subjects | Order One | | Order Two | | Total |
|---|---|---|---|---|---|
| | Regular | Speeded | Regular | Speeded | |
| Blind | 265.752 | 266.549 | 263.792 | 262.042 | 264.534 |
| Sighted | 263.316 | 262.520 | 265.277 | 267.027 | 264.534 |

did not conform to the same pattern within Order One and Order Two.

In Order One, the adjusted mean score of the blind (265.752), was significantly higher than that of the sighted (263.316), for the regular or non-speeded administration of the test. A t ratio of 2.810 between the adjusted mean scores for this non-speeded administration was significant at the .01 level, and supported the conclusion that at the regular speed in Order One a true difference existed between the blind and the sighted groups. The adjusted mean score of the blind (266.549) for the accelerated administration of the test in Order One was also significantly higher than that of the sighted (262.520). A t ratio of 4.647 between the adjusted mean scores for the speeded administration exceeded the ratio (2.59) required for significance at the .01 level. The null hypothesis was rejected, therefore, and it was assumed that in Order One, in which the non-speeded test was administered first, and the speeded test second, a real difference did exist between the performance of the blind and that of the sighted. The significant difference in each case, speeded and non-speeded, in Order One, was in favor of the blind subjects.

In Order Two, the adjusted mean score of the sighted (265.277) was higher than that of the blind (263.792), for the regular or non-speeded administration of the test. A t ratio of 1.712 between the adjusted mean scores for this non-speeded administration, however, was not significant at the .05 level of significance (1.97). It was assumed that the difference found was more reasonably attributed to chance. The null hypothesis of no difference between the blind and the sighted groups, on the non-speeded administration of the test in Order Two, was retained. For the accelerated administration of the test, the adjusted mean score of the sighted (267.027) in Order Two was significantly higher than that of the blind (262.042). A t ratio of 5.749 between the adjusted mean scores for the speeded administration exceeded the ratio (2.59) required for significance at the .01 level. The null hypothesis was rejected, therefore, and it was assumed that a real difference existed in Order Two between the performance of the blind and that of the sighted on the speeded administration of the test. The difference favored the sighted group.

It should be noted that the findings immediately preceding this, i.e., the triple interaction, were findings which existed after the other differences were removed or were held constant. They existed above and beyond the other interactions and main effects and may or may not have been of greater size. However, they were independent findings even though they may not have been especially important to the major question of the research.

The present investigation found the listening comprehension of the total sighted group superior at the .05 level; Hartlage (1963) reported a very slight superiority of the sighted, but no significant difference between the listening comprehension of blind and sighted high school students.

## Differences in Listening Ability Scores in Speeded and Non-Speeded Administrations of the STEP Listening Tests, Forms 4A and 4B

In the statement of the problem, the second and third questions were: Was there a significant difference between the listening ability of the blind subjects tested at the normal reading rate and at the accelerated rate as measured by the STEP Listening Tests? Was there a significant difference between the listening ability of the sighted subjects at the normal reading rate and at the accelerated rate as measured by the STEP Listening Tests?

The subjects obtained significantly higher listening scores on the non-speeded administration. This was true for the blind and for the sighted as tested in the main effect of speededness for the total group in Table 7. The consistent difference in favor of the non-speeded administration was also evident in the significant F-ratios for speededness in Order One and Order Two as tested in Tables 23 and 27, respectively. It should be noted that over and above these main effects there were significant interactions which acted to raise and depress performance with regard to order, sightedness, and speededness, but that the speededness effect was consistent and significant.

There were studies which were in agreement, and studies which were at variance with the findings reported in this investigation. Since most of the research which investigated the relationship between listening comprehension and rate of presentation was limited to a sighted, or to a blind population, and since a significant interaction difference between order and speededness was found in the present investigation, comparison with related research should be made with these variables in mind.

Although Goldstein (1940) reported that increase in rate of presentation was accompanied by a decrease in listening comprehension, the more recent studies have reported a positive relationship between listening ability and speededness. Goodman-Malamuth (1957) found that the listening ability of tenth grade sighted students was adversely affected by rates that were either too fast or too slow. He found 150 wpm was a significantly better rate than 125 wpm. His data indicated that an optimal rate would probably fall between 145 and 160 words per minute. This rate was considerably lower than that approved by other investigators. Iverson (1956) reported higher listening scores for recordings at 193 - 230 words per minute. Fairbanks, Guttman, and Miron (1957) found that maximum listening efficiency was achieved at 282 wpm for relatively simple recorded material. Enc and Stolurow (1960) investigated the relationship between word rate and auditory comprehension of 23 seventh and eighth grade blind children. They reported that in nine out of ten stories the mean was significantly higher for the speeded than for the slower version over a word range of 160 - 233 words per minute. Foulke, Amster, Nolan, and Bixler (1962) attempted to determine the ability of sixth, seventh, and eighth grade braille readers to understand rapid speech. The investigators found that comprehension of material presented orally at 275 words per minute was nearly as good as comprehension of material presented at 175 words per minute. There was no significant loss of comprehension through 275 words per minute. They reported that the study was replicated with sighted subjects with similar results.

Differences in Listening Scores of the Blind and the Sighted in Order One and Order Two Administrations, and Types of Material in STEP Listening Tests, Forms 4A and 4B. Scores from the administration of Form 4A and Form 4B of the STEP Listening Tests were available for 304 subjects. Of these subjects 152 were sighted and 152 were blind. The responses given by each student for the questions on Forms 4A and 4B were subjected to the item analysis described in The Teacher's Guide for Cooperative Sequential Tests of Educational Progress (1959, pp. 42-45). The analysis yielded the scores which each subject attained for expositive, narrative, directive, and aesthetic types of material. The individual scores on Form 4A and Form 4B for each category were combined to provide a total expositive score, a total narrative score, a total score for direction, and a total aesthetic score for each of the 304 subjects. The resultant scores represented the total number of correct answers achieved by the individual subjects under each of the four types of material. Since the total number of questions posed was not equal for each of the four categories, each of the four total scores for each subject was converted into a percent. These percents provided scores which were comparable between and among the four categories. The scores thus obtained were used in a two-way classification analysis of variance for each of the four categories. This procedure made it possible to test a sightedness mean difference, an order mean difference, and an interaction difference of sightedness x order for each of the four types of material, namely, expositive, narrative, directive, and aesthetic.

Question four asked: Was there a significant difference between the listening ability of the blind subjects and the listening ability of the sighted subjects for each of the kinds of material heard, namely, expositive, narrative, directive, and aesthetic materials?

(a) Expositive Listening Scores. An analysis of variance yielded the results which were presented in Table 11.

An F-ratio of 6.634 was computed for the sightedness difference for the expositive type of listening material. Since this ratio exceeded that required for significance at the .05 level, the null hypothesis was rejected. It was assumed that a true difference existed between the measured expositive listening scores of the blind and those of the sighted. A comparison of the mean score of the blind (60.756) and that of the sighted (65.927) showed that the significant difference was in favor of the sighted group. Data in Table 12 indicated that the difference between the scores of the blind and those of the sighted in Order Two contributed the major portion of the variance.

An F-ratio of .296 for differences between Order One and Order Two was not significant at the .05 level. The null hypothesis of no difference between Order One and Order Two for the total group of subjects on the expositive listening scores was retained.

### Table 11

### Analysis of Variance of Expositive Listening Scores on the STEP Listening Tests, Forms 4A and 4B for the Total Group

| Source | df | Sums of Squares | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between | 3 | 4207.222 | | |
| Sightedness | 1 | 2032.223 | 2032.223 | 6.634 |
| Order | 1 | 90.735 | 90.735 | .296 |
| Sightedness X Order | 1 | 2084.264 | 2084.264 | 6.804 |
| Within | 300 | 91889.944 | 306.300 | |
| Total | 303 | 96097.166 | | |

## Table 12

### Mean Scores in Expositive Listening for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 63.789 | 57.723 | 60.756 |
| Sighted | 63.723 | 68.131 | 65.927 |
| Total | 63.756 | 62.927 | 63.342 |

The F-ratio of 6.804 for the interaction variance between sightedness and order exceeded the ratio (6.72) required for significance at the .01 level. The null hypothesis was rejected and it was assumed that a real difference existed when the effects of sightedness and order were combined. The data in Table 13 showed the adjusted mean scores for the blind and for the sighted in both Order One and Order Two. Inspection of the data showed that in Order One the difference in mean scores favored the blind subjects, whereas in Order Two the difference was in favor of the sighted. From the data obtained it was assumed that a true difference existed between the performance of the blind and that of the sighted in expositive listening in both Order One and Order Two. In Order One, in which the regular administration preceded the speeded one, the difference was in favor of the blind. In Order Two, in which the speeded administration preceded the regular one, the difference was in favor of the sighted group.

Table 13

Adjusted Mean Expositive Listening Scores for Interpreting Interaction: Sightedness X Order for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 65.961 | 60.724 | 63.342 |
| Sighted | 60.724 | 65.961 | 63.342 |

(b) Narrative Listening Scores. The analysis of variance computed from the scores for the narrative type of listening yielded the results which were recorded in Table 14.

An F-ratio of 18.312 was obtained for the main effect of sightedness for the narrative listening scores. Because this ratio exceeded that required for the .01 level of significance, it was assumed that a real difference existed between the measured narrative listening scores of the blind and those of the sighted. Since there were only two groups, the mean scores recorded in Table 15 were inspected. The mean score of the blind on narrative listening was 60.421 whereas the mean score of the sighted was 67.921. The significant difference, which exceeded the .01 level, was in favor of the sighted.

An F-ratio of 1.185 computed from the difference between Order One and Order Two was not significant at

## Table 14

Analysis of Variance of Narrative Listening Scores on the STEP Listening Tests, Forms 4A and 4B for the Total Group

| Source | df | Sums of Squares | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between | 3 | 5791.763 | | |
| Sightedness | 1 | 4274.999 | 4274.999 | 18.312 |
| Order | 1 | 276.645 | 276.645 | 1.185 |
| Sightedness X Order | 1 | 1240.119 | 1240.119 | 5.312 |
| Within | 300 | 70033.343 | 233.444 | |
| Total | 303 | 75825.106 | | |

Table 15

Mean Scores in Narrative Listening for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 61.486 | 59.355 | 60.421 |
| Sighted | 64.947 | 70.894 | 67.921 |
| Total | 63.217 | 65.125 | 64.171 |

the .05 level. The null hypothesis of no difference between Order One and Order Two for the total group of subjects on narrative listening scores was retained.

The F-ratio of 5.312 computed for the interaction of sightedness and order was significant at the .05 level. It was assumed, therefore, that a real difference existed when the effects of the two factors of sightedness and order were combined.

The data in Table 16 presented the adjusted mean scores for Order One and Order Two. Inspection of the data showed that the difference between the adjusted mean scores favored the blind in Order One, whereas the difference in Order Two favored the sighted. The significant interaction F-ratio (5.312) arose because the blind performed better on Order One than they did on Order Two, whereas the sighted performed better on Order Two than they did on Order One. It was noted

Table 16

Adjusted Mean Narrative Listening Scores for Interpreting Interaction: Sightedness X Order for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 66.190 | 62.151 | 64.171 |
| Sighted | 62.151 | 66.190 | 64.171 |

previously, however, as shown in Table 15, that the mean scores of the sighted group were superior to those of the blind group in both Order One and Order Two. The superiority of the sighted group in both Orders was unique to the narrative type of material; it was not found in the other three types of material investigated.

(c) Directive Listening Scores. The results of the analysis of variance computed from the scores for the directive type of listening material were presented in Table 17. An examination of that table showed an F-ratio of .014 for the sightedness variance and an F-ratio of .097 for the variance between Order One and Order Two. Neither of these ratios was significant at the .05 level. It was concluded, therefore, that there was no real difference between the measured performance of the blind and the sighted subjects on the directive type of listening materials in this investigation. It was further

Table 17

Analysis of Variance of Directive Listening Scores on the STEP Listening Tests, Forms 4A and 4B for the Total Group

| Source | df | Sums of Squares | Mean Square | F-ratio |
|---|---|---|---|---|
| Between | 3 | 1436.236 | | |
| Sightedness | 1 | 3.802 | 3.802 | .014 |
| Order | 1 | 25.473 | 25.473 | .097 |
| Sightedness X Order | 1 | 1406.961 | 1406.961 | 5.391 |
| Within | 300 | 78290.922 | 260.970 | |
| Total | 303 | 79727.158 | | |

concluded that no real difference was found between the performance of the total group on Order One, and the performance of the total group on Order Two.

An F-ratio of 5.391 for the interaction of sightedness x order was significant at the .05 level. The null hypothesis of no interaction difference was rejected. It was concluded that, when the two factors of sightedness and order were combined, a real difference was found between the listening scores of the sighted, and those of the blind for the directive type of listening material. Inspection of the data in Table 18 showed that the difference was in favor of the blind group in Order One and of the sighted group in Order Two. An adjustment of the mean scores was made to remove row and column differences. The significant interaction F-ratio (5.391) arose from the fact that the achievement of the blind and sighted groups did not conform to the same pattern within Order One and Order Two. Inspection of the adjusted mean scores in Table 19 indicated that the blind subjects achieved a higher adjusted mean score for the directive type of listening than the sighted subjects in Order One. In Order Two, these results were reversed; the sighted subjects achieved a higher adjusted mean score than the blind for the directive type of listening material.

Table 18

Mean Scores in Directive Listening for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 70.276 | 65.394 | 67.835 |
| Sighted | 66.197 | 69.921 | 68.059 |
| Total | 68.236 | 67.657 | 67.947 |

Table 19

Adjusted Mean Directive Listening Scores for Interpreting Interaction: Sightedness X Order for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 70.099 | 65.796 | 67.947 |
| Sighted | 65.796 | 70.099 | 67.947 |

(d) Aesthetic Listening Scores. The results of the analysis of variance computed from the scores for the aesthetic type of listening material were presented in Table 20.

Neither the F-ratio of 1.512 for the sightedness effect in the aesthetic listening scores, nor the F-ratio of .028 for the order effect, was significant at the .05 level. The null hypothesis was retained, therefore, and

## Table 20

Analysis of Variance of Aesthetic Listening Scores on the STEP Listening Tests, Forms 4A and 4B for the Total Group

| Source | df | Sums of Square | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between | 3 | 2185.720 | | |
| Sightedness | 1 | 457.661 | 457.661 | 1.512 |
| Order | 1 | 8.556 | 8.556 | .028 |
| Sightedness X Order | 1 | 1719.503 | 1719.503 | 5.681 |
| Within | 300 | 90791.119 | 302.637 | |
| Total | 303 | 92976.839 | | |

it was assumed that no real difference was found between the measured aesthetic listening scores of the blind and those of the sighted subjects, nor between Order One and Order Two for the total group of subjects.

The interaction F-ratio of 5.681 between sightedness and order was significant beyond the .05 level. The null hypothesis of no interaction difference was rejected, therefore, and it was assumed that when the sightedness and order factors were combined, a real difference existed between the aesthetic listening scores of the sighted and those of the blind. Inspection of the data in Table 21 revealed that the difference was in favor of the blind in Order One and of the sighted group in Order Two. An adjustment of the mean scores was made to remove row and column differences. Inspection of the adjusted mean scores recorded in Table 22 revealed that the significant interaction arose from the fact that the achievement of the blind group and that of the sighted group did not conform to the same pattern within Order One and Order Two. The blind subjects achieved a higher adjusted mean score for aesthetic listening in Order One than the sighted subjects. In Order Two, these results were reversed; the sighted subjects achieved a higher adjusted mean score than the blind for the aesthetic type of listening material.

Table 21

Mean Scores in Aesthetic Listening for the Total Group

| Subjects | Order One | Order Two | Total |
|---|---|---|---|
| Blind | 65.960 | 61.539 | 63.750 |
| Sighted | 63.657 | 68.750 | 66.203 |
| Total | 64.809 | 65.144 | 64.976 |

Table 22

Adjusted Mean Aesthetic Listening Scores for Interpreting Interaction: Sightedness X Order for the Total Group

| | | | |
|---|---|---|---|
| Blind | 67.353 | 62.597 | 64.976 |
| Sighted | 62.597 | 67.355 | 64.976 |

A thorough examination of research related to listening revealed very little investigation into the differences in listening ability attributable to the various types of listening material. In the present investigation the lowest mean for the blind when compared with the sighted was in narrative listening; the smallest difference between the blind and the sighted was in directive listening. In all comparisons the sighted were consistently superior. The difference between the highest and the lowest mean was 2.132 for the sighted and 7.414

for the blind. In a comparative study made with blind sixth and seventh graders, Lowenfeld (1945) provided for differentiation between narrative and "textbook" factual information. His results indicated that narrative listening scores were higher than the scores for informational material for both braille reading, and for listening. At the sixth grade level there was a mean difference of 2.57 in favor of the narrative material.

Bixler, Foulke, Amster, and Nolan (1962) presented two types of material, one literary and one scientific, to blind subjects in the sixth, seventh, and eighth grades. Significant differences were found between comprehension of literary and scientific material. The difference favored the literary material at the .01 level.

Several studies were concerned with level of difficulty of listening materials. Goldstein (1940) studied the effect of difficulty of material upon listening and reading, as a subsidiary problem to his basic study of comprehension at various controlled rates of presentation. He found that relative superiority of listening over reading comprehension diminished with increasing difficulty of material.

Harwood (1955) did not study the relationship between listening and various types of material, but his experimental research did investigate the listenability of stories of different predicted difficulty. Harwood reported that rank-order listenability of the stories at each rate of presentation was consistent with the rank-order predicted for readability of the stories; the rank-order correlations were significant at the .01 level.

In a comparison of listening and reading comprehension of fourth and sixth grade sighted children, Hampleman (1958) did not differentiate between kinds of material. He did, however, investigate the effect of level of difficulty of narrative material on reading and listening ability. He concluded that easy material was more readily comprehended than hard material, and that listening was superior to reading comprehension for both fourth and sixth grade children.

### Order One

Differences in Listening Ability Scores of Blind and Sighted Groups at Three Levels of Intelligence in Speeded and Non-Speeded Administrations. Order One and Order Two were the terms used in this investigation to differentiate between two groups of subjects. Order One was used to designate that group of subjects to whom the listening test was administered at the regular recording rate first. On the day following the non-speeded administration, the equivalent alternate form of the test was administered at a speeded rate. Scores for Order One from the administration of the Sequential Tests of Educational Progress: Listening, Forms 4A and 4B, were available for 135 subjects classified in three ability levels. Of this group, 75 subjects were blind, and 60 subjects were sighted. Since each subject received a speeded and a non-speeded form of the test, a total of 270 scores resulted. The data provided in Table 4 showed the distribution of subjects according to ability level, before and after subjects were randomly eliminated to obtain proportionate cell frequencies. A ratio of five blind subjects to four sighted subjects was selected as that which would retain the maximum number of subjects and also maintain a sufficient number in each cell to insure reliable conclusions based on the findings.

Through the use of analysis of variance, it was possible to test a sightedness mean difference, an intelligence level mean difference, a speededness mean difference, an interaction difference of sightedness x intelligence level, an interaction of sightedness x speededness, an interaction of intelligence level x speededness, and a triple interaction of sightedness x intelligence level x speededness. The results of the analysis of variance computed according to Type III mixed design (Lindquist, 1953, p. 284) were presented in Table 23. Through analysis of the data in Table 23, it was possible to answer question five with respect to Order One.

The fifth question presented in the statement of the problem asked: Was there a significant difference

## Table 23

Analysis of Variance of Scores at Three Ability Levels for Blind and Sighted Subjects on the STEP Listening Tests, Forms 4A and 4B in Order One

| Source | df | Sums of Squares | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between Subjects | 134 | 33821.741 | | |
| Sightedness | 1 | 21.407 | 21.407 | .129 |
| Intelligence | 2 | 12442.389 | 6221.194 | 37.679 |
| Sightedness X Intelligence | 2 | 58.891 | 29.445 | .178 |
| Error (Between) | 129 | 21299.054 | 165.108 | |
| Within Subjects | 135 | 1451.500 | | |
| Speededness | 1 | 116.033 | 116.033 | 12.526 |
| Sightedness X Speededness | 1 | 76.327 | 76.327 | 8.239 |
| Intelligence X Speededness | 2 | 27.930 | 13.965 | 1.507 |
| Sightedness X Intelligence X Speededness | 2 | 36.240 | 18.120 | 1.956 |
| Error (Within) | 129 | 1194.970 | 9.263 | |

between the listening ability of the blind subjects and that of the sighted subjects at each of three levels of intelligence, namely, high, average, and low at regular speed? At accelerated speed?

An F-ratio of .129 was computed for the variance between the sighted and the blind subjects. Since this ratio was not significant at the .05 level the null hypothesis was retained; it was assumed that no real difference existed between the measured listening scores of the sighted and the blind subjects in Order One, in which the initial test administration was non-speeded, and the second test was a speeded administration.

An F-ratio of 37.679 was computed from the intelligence variance; this ratio exceeded that required (4.78) at the .01 level. The null hypothesis was rejected and it was assumed that a real difference existed between and among the measured listening scores of the three ability levels. Inspection of the mean scores in Table 24 revealed that the difference favored the high intelligence level over the average, the high intelligence over the low, and the average over the low ability level. The three t ratios, 5.745, 8.324, and 3.617 for the differences between the mean listening scores of the high and the average, the high and the low, and the average and the low ability levels, respectively, were each significant at the .01 level. It was concluded, therefore, that the measured listening

Table 24

Mean Listening Scores at Three Ability Levels in Order One

| Ability Levels | Blind |  | Sighted |  | Total |  |
|---|---|---|---|---|---|---|
|  | N | M | N | M | N | M |
| High | 30 | 271.833 | 24 | 271.842 | 54 | 271.879 |
| Average | 30 | 261.983 | 24 | 260.017 | 54 | 261.842 |
| Low | 15 | 255.093 | 12 | 252.791 | 27 | 254.129 |
| Total | 75 | 264.566 | 60 | 264.000 | 135 | 264.314 |

ability of the high intelligence level was significantly superior to both the average and the low ability levels, and that the measured listening ability of the average level was significantly superior to the low intelligence level.

When the interaction variance, sightedness x intelligence, was computed an F-ratio of .178 was found. Since this ratio was not significant at the .05 level, the null hypothesis of no interaction difference was retained. It was assumed, therefore, that the intelligence factor did not operate selectively between the mean listening performance of the sighted and that of the blind.

The speededness variance yielded an F-ratio of 12.526 which exceeded the value needed for significance at the .01 level. The null hypothesis was rejected and it was assumed that a real difference existed between the measured listening scores on the regular and the accelerated administrations of the tests. There were only two groups, the regular and the speeded; inspection of the mean score for the speeded administration (263.659) and that for the non-speeded administration (264.970) showed that the significant difference favored the regular or non-speeded administration.

When the sightedness x speededness interaction variance was computed, an F-ratio of 8.239 was obtained. This ratio exceeded the value needed for significance at the .01 level. It was assumed, therefore, that a real difference existed between the measured listening scores of the blind and those of the sighted subjects when the effects of the two factors of sightedness and speededness were combined. A t ratio of 1.955 between the regular and the speeded mean scores for the blind approached, but did not satisfy, the ratio required (1.98) for significance at the .05 level. A t ratio of 2.172 between the regular and speeded mean scores for the sighted was significant at the .05 level. The significant interaction (8.239) arose from the fact that the performance of the blind subjects and that of the sighted did not follow the same pattern in the regular and in the accelerated administrations of the tests. Inspection of the adjusted mean scores provided in Table 25 indicated, that in the non-speeded administration the difference favored the blind, but not significantly so. The significant difference in the accelerated administration

Table 25

Adjusted Mean Scores for Interpreting Interaction: Sightedness X Speededness in Order One

| Administration Rate | Blind | Sighted | Total |
|---|---|---|---|
| Regular | 263.838 | 264.908 | 264.314 |
| Speeded | 264.789 | 263.719 | 264.314 |

favored the sighted group.

The intelligence X speededness interaction F-ratio was computed to be 1.507. Since this ratio was not significant at the .05 level, the assumption was made that no difference existed between the measured listening scores of the sighted and the blind when the effects of the two factors of intelligence and speededness were combined.

An F-ratio of 1.956 for the triple interaction, sightedness x intelligence X speededness, was not significant at the .05 level. The null hypothesis was retained, therefore, and it was assumed that no difference existed between the measured listening scores of the sighted and the blind subjects when the effects of the three factors of sightedness, intelligence, and speededness were combined.

The sixth question in the statement of the problem asked: Was there a correlation between level of intelligence (high, average, and low) and listening ability of the blind subjects tested at regular speed? At accelerated speed?

Examination of the mean listening scores (Table 26) obtained by the blind subjects showed a positive correlation between intelligence level and listening ability at both the regular and the accelerated speeds in Order One. The regular mean score (271.666) and the accelerated mean score (272.000) of the high ability group exceeded the corresponding scores of the average group for both the regular (262.566) and the accelerated (261.400) administrations. The high ability and the average ability blind groups each exceeded the mean scores of the low ability group for both the regular (255.266) and the accelerated (255.133) administrations.

The seventh question in the statement of the problem asked: Was there a correlation between level of intelligence (high, average, and low) and listening ability of the sighted subjects tested at regular speed? At accelerated speed?

Examination of the mean listening scores obtained by the sighted subjects showed a positive correlation between intelligence level and listening ability at both the regular and the accelerated speeds in Order One. The regular mean score (273.666) and the accelerated mean score (270.208) of the high ability group exceeded the corresponding scores of the average group for both the

Table 26

Mean Listening Scores at Three Ability Levels for Regular and Accelerated Speeds in Order One

| Ability Levels | N | Blind |  | N | Sighted |  |
|---|---|---|---|---|---|---|
|  |  | Regular | Speeded |  | Regular | Speeded |
| High | 30 | 271.666 | 272.000 | 24 | 273.666 | 270.208 |
| Average | 30 | 262.566 | 261.400 | 24 | 263.042 | 260.292 |
| Low | 15 | 255.266 | 255.133 | 12 | 252.833 | 252.750 |

regular (263.042) and the accelerated (260.292) administrations. The high ability and the average ability sighted groups each exceeded the mean scores of the low ability group for both the regular (252.833) and the accelerated (252.750) administrations. Also, it should be noted that none of the interactions involving intelligence were significant and that the significant main effects would be assumed to apply to each of the subgroups.

Order Two

Differences in Listening Ability Scores of Blind and Sighted Groups at Three Levels of Intelligence in Speeded and Non-Speeded Administrations. Order Two was the term used to signify that group of subjects to whom one form of the listening test was administered at the speeded recording rate first. On the day following the speeded administration, the equivalent alternate form of the test was administered at a non-speeded rate. Scores for Order Two from the administration of the Sequential Tests of Educational Progress: Listening, Forms 4A and 4B, were available for 119 subjects classified in three ability levels. Of this group 68 subjects were blind, and 51 subjects were sighted. Since each subject received a speeded and a non-speeded form of the test, a total of 238 scores resulted. The data provided in Table 5 in Section III showed the distribution of subjects according to ability level, before and after subjects were randomly eliminated to obtain proportionate cell frequencies. A ratio of four blind subjects to three sighted subjects was selected as that which would retain the maximum number of subjects and also maintain a sufficient number in each cell to insure reliable conclusions based on the findings.

Through the use of analysis of variance, it was possible to test a sightedness mean difference, an intelligence level mean difference, a speededness mean difference, an interaction difference of sightedness x intelligence level, an interaction of sightedness x speededness, an interaction of intelligence level x speededness, and a triple interaction of sightedness x intelligence level x speededness. The results of the analysis of variance computed according to Type III mixed design (Lindquist, 1953, p. 284) were presented in Table 27. Through an analysis of the data in Table 27, it was possible to answer question five with respect to Order Two.

The fifth question presented in the statement of the problem asked: Was there a significant difference between the listening ability of the blind subjects and that of the sighted subjects at each of three levels of intelligence, namely, high, average, and low at regular speed? At accelerated speed?

An F-ratio of 7.252 was computed for the variance between the sighted and the blind. This ratio exceeded the value needed for significance at the .01 level. The null

Table 27

Analysis of Variance of Scores at Three Ability Levels for Blind and Sighted Subjects on the STEP Listening Tests, Forms 4A and 4B in Order Two

| Source | df | Sums of Squares | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between Subjects | 118 | 33190.110 | | |
| Sightedness | 1 | 1153.440 | 1153.440 | 7.252 |
| Intelligence | 2 | 13860.036 | 6930.018 | 43.575 |
| Sightedness X Intelligence | 2 | 205.820 | 102.910 | .647 |
| Error (Between) | 113 | 17970.814 | 159.034 | |
| Within Subjects | 119 | 10515.703 | | |
| Speededness | 1 | 1153.681 | 1153.681 | 14.326 |
| Sightedness X Speededness | 1 | 229.160 | 229.160 | 2.845 |
| Intelligence X Speededness | 2 | .481 | .241 | .002 |
| Sightedness X Intelligence X Speededness | 2 | 32.523 | 16.263 | .201 |
| Error (Within) | 113 | 9099.858 | 80.529 | |

hypothesis was rejected, therefore, and it was assumed that a real difference existed between the measured listening scores of the sighted and those of the blind in Order Two, in which the initial test administration was speeded and the second test was a non-speeded administration. There were only two groups, sighted and blind; a comparison of the mean scores showed that the mean score of the sighted (265.735) was superior to the mean achieved by the blind (261.286). The significant difference was in favor of the sighted subjects.

When the intelligence level variance was tested, an F-ratio of 43.575 resulted. This significant ratio exceeded the value needed for significance at the .01 level. The null hypothesis was rejected and it was assumed that a real difference existed among the measured listening scores of the three ability levels. Inspection of the mean scores in Table 28 revealed that the difference favored the high intelligence over the average, the high intelligence over the low, and the average intelligence over the low ability level. The three t ratios, 6.134, 11.175, and 5.002 for the differences between the mean listening scores of the high and the average, the high and the low, and the average and the low ability levels, respectively, were each significant at the .01 level. It was concluded, therefore, that the measured listening ability of the high intelligence level was significantly superior to

## Table 28

## Mean Listening Scores at Three Ability Levels in Order Two

| Ability Levels | Blind |  | Sighted |  | Total |  |
|---|---|---|---|---|---|---|
|  | N | M | N | M | N | M |
| High | 24 | 270.541 | 18 | 273.972 | 42 | 272.011 |
| Average | 32 | 259.828 | 24 | 263.520 | 56 | 261.410 |
| Low | 12 | 246.666 | 9 | 255.166 | 21 | 250.309 |
| Total | 68 | 261.286 | 51 | 265.735 | 119 | 263.193 |

both the average and the low intelligence levels, and that the measured listening ability of the average level was significantly superior to the low intelligence level.

The interaction variance, sightedness x intelligence yielded an F-ratio of .647 which was not significant at the .05 level. The null hypothesis of no interaction difference was retained. It was assumed that the intelligence factor did not operate selectively between the mean listening performance of the sighted and that of the blind.

The speededness variance yielded an F-ratio of 14.326 which exceeded significance at the .01 level. The null hypothesis was rejected and it was assumed that a real difference existed between the measured listening scores on the regular and the accelerated administrations of the tests. There were only two groups, the regular and the speeded; inspection of the mean score for the speeded administration (260.991) and that for the non-speeded (265.394) showed that the significant difference favored the regular or non-speeded administration.

When the sightedness x speededness interaction variance was computed an F-ratio of 2.845 was obtained. The ratio was not significant at the .05 level; therefore, the null hypothesis was retained. It was assumed, therefore, that the speededness factor did not operate selectively between the mean listening performance of the blind and that of the sighted in Order Two. It may be noted that this finding may seem to contradict the finding in the previous section. However, the interactions were different in each order; this may be seen in the variance analysis in Table 7 where the triple interaction was significant. The fact that the sightedness x speededness interaction was different in each order produced the higher significant order interaction.

The intelligence x speededness interaction F-ratio was .002. Since this ratio was not significant at the .05 level, the assumption was made that no difference existed between the measured listening scores of the sighted and the blind when the effects of the two factors of intelligence and sightedness were combined.

An F-ratio of .201 for the triple interaction, sightedness x intelligence x speededness, was not significant at the .05 level. The null hypothesis was retained, therefore, and it was assumed that no difference existed between the measured listening scores of the sighted and the blind subjects when the effects of the three factors of sightedness, intelligence, and speededness were combined.

The sixth question in the statement of the problem asked: Was there a correlation between level of intelligence (high, average, and low) and listening ability of the blind subjects tested at regular speed? At accelerated speed?

Examination of the mean listening scores (Table 29) obtained by the blind subjects showed a positive correlation between intelligence level and listening ability at both the regular and the accelerated speeds in Order Two. The regular mean score (274.042) and the accelerated mean score (267.042) of the high ability group exceeded the corresponding scores of the average group for both the regular (262.563) and the accelerated (257.094) administrations. The high ability and the average ability blind groups each exceeded the mean scores of the low ability group for both the regular (249.666) and the accelerated (243.666) administrations.

The seventh question in the statement of the problem asked: Was there a correlation between level of intelligence (high, average, and low) and listening ability of the sighted subjects tested at regular speed? At accelerated speed?

Examination of the mean listening scores obtained by the sighted subjects showed a positive correlation between intelligence level and listening ability at both the regular and the accelerated speeds in Order Two. The regular mean score (274.555) and the accelerated mean score (273.389) of the high ability group exceeded the corresponding scores of the average group for both the regular (265.000) and the accelerated (262.042) administrations. The high ability and the average ability

Table 29

Mean Listening Scores at Three Ability Levels for Regular and Accelerated Speeds in Order Two

| Ability Levels | Blind | | | Sighted | | |
|---|---|---|---|---|---|---|
| | N | Regular | Speeded | N | Regular | Speeded |
| High | 24 | 274.042 | 267.042 | 18 | 274.555 | 273.389 |
| Average | 32 | 262.563 | 257.094 | 24 | 265.000 | 262.042 |
| Low | 12 | 249.666 | 243.666 | 9 | 256.111 | 254.222 |

sighted groups each exceeded the mean scores of the low ability group for both the regular (256.111) and the accelerated (254.222) administrations.

The findings of this study relative to the positive relationship between intelligence and listening ability were in agreement with the findings of previous investigators. In studies made with sighted children in the intermediate grades, Hollow (1955) reported a correlation of +.42 between listening and intelligence for fifth grade pupils. Kramar (1955) reported a correlation of +.54 between the Brown-Carlsen Listening Comprehension Test and the Wechsler-Bellevue Intelligence Test, and a correlation of +.55 between the A.C.E. Intelligence Test and the Brown-Carlsen Listening Test. In a comparison of listening and reading comprehension of Brazilian second and third graders, Biggins (1961) concluded that listening ability had a strong relationship with intelligence. At the intermediate grade level, Cleland and Toussaint (1962) reported a correlation of +.6349 between the SRA primary mental abilities and the STEP listening tests. Hartlage (1963) reported a correlation of +.66 for sighted, and +.79 for blind high school students, between intelligence and listening scores.

### Integrated Programs and Special Schools for the Blind

### Differences in Listening Ability Scores of Blind

Subjects in Integrated Programs and Blind Subjects in Special Schools for the Blind. There were 152 blind subjects, 76 of these subjects attended integrated programs and the remaining 76 subjects attended special schools for the blind. Two scores were available for each of the 152 blind subjects from the administration of Form 4A and Form 4B of the listening tests. Each student took a speeded and a non-speeded form of the test. Table 1 in Section III showed the distribution of subjects according to the type of school attended, and the order in which the regular and speeded forms of the tests were administered.

The eighth question proposed in the statement of the problem was: Was there a significant difference in the listening ability of subjects attending special schools for the blind and the listening ability of blind subjects attending integrated programs?

A three way classification analysis of variance with repeated measures made it possible to test a mean difference for type of school program attended, an order mean difference, a speededness mean difference, an interaction difference of school program x order, an interaction difference of order x speededness, an interaction difference of type of school program x speededness, and an interaction difference of type of school x order x speededness. The results of the analysis of variance computed according to Type III mixed design (Lindquist, 1953, p. 284) were presented in Table 30.

Since the F-ratio of 1.305, computed for the difference between the mean listening scores of the integrated blind subjects and the mean scores of the subjects from special schools, did not attain significance at the .05 level, it may be concluded that no real difference existed between the measured listening scores of the two groups.

An F-ratio of 2.057 indicated that no significant difference was found between the mean of the total group of blind subjects who took the non-speeded test first and the mean of the total group of blind subjects who took the speeded test first.

An interaction F-ratio of 4.981 between order and type of school attended was significant beyond the .05 level. Inspection of the adjusted mean scores shown in Table 31 showed that the significant interaction was due to the fact that in Order One the difference between means favored the integrated group, whereas in Order Two the difference favored the special school group.

The F-ratio of 7.900 which resulted from the variance between the speeded and the non-speeded administrations of the tests was significant beyond the .01 level. The null hypothesis was rejected; it was more reasonable to assume that a real difference did exist between the mean scores achieved under the

### Table 30

### Analysis of Variance of Scores of Blind Subjects in Two School Programs on the STEP Listening Tests, Forms 4A and 4B

| Source | df | Sums of Squares | Mean Square | *F*-ratio |
|---|---|---|---|---|
| Between Subjects | 151 | 48822.894 | | |
| Type of School | 1 | 407.578 | 407.578 | 1.305 |
| Order | 1 | 642.644 | 642.644 | 2.057 |
| Type of School X Order | 1 | 1555.697 | 1555.697 | 4.981 |
| Error (Between) | 148 | 46216.975 | 312.276 | |
| Within Subjects | 152 | 16044.000 | | |
| Speededness | 1 | 776.960 | 776.960 | 7.900 |
| Order X Speededness | 1 | 563.803 | 563.803 | 5.732 |
| Type of School X Speededness | 1 | 142.317 | 142.317 | 1.447 |
| Type of School X Order X Speededness | 1 | 5.262 | 5.262 | .054 |
| Error (Within) | 148 | 14555.658 | 98.349 | |

Table 31

Adjusted Mean Scores for Interpreting Interactions: Type of School X Order for Blind Subjects

| School Program | Order One | Order Two | Total |
|---|---|---|---|
| Integrated | 264.256 | 261.677 | 262.967 |
| Special | 261.677 | 264.256 | 262.967 |

accelerated and the non-accelerated administrations. Inspection of the mean scores for the regular (264.565) and for the speeded (261.368) established the fact that the significant difference was in favor of the regular or non-speeded administration.

Since the F-ratio of 5.732, computed for the order x speededness interaction, exceeded the .05 level of significance, the null hypothesis was rejected. Inspection of the adjusted mean scores in Table 32 demonstrated that the significant interaction arose because in Order One the difference was in favor of the speeded administration, whereas in Order Two the difference favored the regular or non-speeded administration. There may have been a practice effect, since the advantage favored the second administration in each instance.

Table 32

Adjusted Mean Scores for Interpreting Interaction: Order X Speededness for Blind Subjects

| Administration Rate | Order One | Order Two | Total |
|---|---|---|---|
| Regular | 261.605 | 264.329 | 262.967 |
| Speeded | 264.329 | 261.605 | 262.967 |

The interaction F-ratio of 1.447 for type of school attended X speededness did not satisfy the ratio (3.90) required for significance at the .05 level. The null hypothesis was retained and it was assumed that the speededness factor did not operate selectively between the two types of schools when their total speeded scores and their total regular scores were subjected to analysis of variance.

An F-ratio of .054 was found for the triple interaction of type of school attended x order x speededness. The null hypothesis of no difference was accepted and it was assumed that no real difference existed between the measured listening scores of the integrated group and those of the special school group when the effects of the three factors of type of school, order, and speededness were combined.

## SECTION V

## Summary, Conclusions, and Implications

### Summary

This investigation sought to measure, and to determine the significance of differences in the listening ability of blind and sighted children in the intermediate grades. Standardized listening test scores were examined for mean differences in the listening ability of these two groups of children, under the influence of factors of speededness, intelligence level, kinds of listening material, and the type of school attended by the blind subjects. This study sought to answer the following questions:

1. Was there a significant difference in the listening ability of the blind subjects and the listening ability of the sighted subjects in this study, as determined by the STEP Listening Tests recorded at regular speed? At accelerated speed?

2. Was there a significant difference between the listening ability of the blind subjects tested at the normal reading rate and at the accelerated rate as measured by the STEP Listening Tests?

3. Was there a significant difference between the listening ability of the sighted subjects tested at the normal reading rate and at the accelerated rate as measured by the STEP Listening Tests?

4. Was there a significant difference between the listening ability of the blind subjects and the listening ability of the sighted subjects for each of the kinds of material heard, namely, expositive, narrative, directive, and aesthetic materials?

5. Was there a significant difference between the listening ability of blind subjects and that of sighted subjects at each of these three levels of intelligence, namely, high, average, and low, at regular speed? At accelerated speed?

6. Was there a correlation between level of intelligence (high, average, and low) and listening ability of the blind subjects tested at regular speed? At accelerated speed?

7. Was there a correlation between level of intelligence (high, average, and low) and listening ability of the sighted subjects tested at regular speed? At accelerated speed?

8. Was there a significant difference in the listening ability of subjects attending special schools for the blind and the listening ability of blind subjects attending integrated programs?

The investigation was conducted with an equal number of blind and of sighted students of both sexes in the fourth, fifth, and sixth grades of the elementary school. The total sample of 304 children represented 61 schools; eight of these schools contributed subjects to both the blind and the sighted samples. The legally blind braille readers were students of a total of 43 schools. These schools included three special schools for the blind in New York State, and a total of 40 public and parochial schools in the New York Metropolitan Area, which offered integrated educational programs for blind students. The blind subjects represented the special school, the resource room, and the itinerant teacher type programs. The sighted sample was randomly selected from a total of 26 schools, which were located in the various counties from which the blind sample had been drawn. Public and parochial schools contributed an equal number of subjects to the sighted group.

The materials utilized in this investigation included a Model 53 Audiometer, a Wollensak model tape recorder, and two pre-recorded equivalent forms of the Sequential Tests of Educational Progress: Listening, published by Educational Testing Service, Princeton, New Jersey.

The initial step in the procedure was the selection of a representative sampling of blind and of sighted subjects. An explanation of the purposes and the plan of the proposed research accompanied the requests for permission to test blind and sighted intermediate grade children. The requests were granted by the

Division of Child Welfare and the Bureau of Educational Research of the Board of Education of the City of New York, the superintendents of the various school districts involved, the supervisors of the educational programs for the visually handicapped, and the principal of each participating school. After the subjects had been identified, the testing schedule was arranged with the principals, the resource room teacher, the itinerant teachers, and the classroom teachers.

The final arrangements and accomodation of the schedule were followed by the actual administration of the listening tests. Both forms of the test, Forms 4A and 4B, had been recorded on tape at speeds of 175 and 225 words per minute. Each subject participated in two testing sessions. The two equivalent forms of the test, and the two auditory rates, were so administered that in the initial testing sessions ¼ of each subject group took Form 4A at the regular rate, and ¼ took it at the speeded rate; ¼ took Form 4B at the regular rate, and ¼ took it at the speeded rate. At the second testing session, on the following day, the procedure was reversed for each subject group, so that the alternate equivalent form was administered at the alternate auditory rate. All of the students indicated their preferred answers by pencil marking the print or braille answer sheets provided.

The print and braille answer sheets were scored by the investigator. Each raw score yielded a converted score and both the raw and the converted scores were recorded. The converted scores provided the data used in the statistical procedures of the investigation.

In order to avoid any score variation due to an auditory handicap, each subject was screened for hearing deficiencies through the use of the Model 53 Audiometer.

The statistical evaluation of the data was accomplished through the use of repeated measures analysis of variance. A three-way classification analysis of variance described as the Type III Design (Lindquist, 1953, p. 284) was employed with the data for each of the following: the total subject groups, the three ability levels in Order One, the three ability levels in Order Two, and the types of school attended by the blind subjects. This design was an appropriate one for measuring the effects of sightedness, speededness, order of test administration, level of intelligence, type of school attended by the blind, and the various interactions of these factors, on the measured listening ability of the blind and sighted subjects.

A two-way classification analysis of variance was used to analyze the data for each of the four types of listening material investigated: expositive, narrative, directive, and aesthetic. Such an analysis permitted the measurement of the effects of sightedness, order of test administration, and the interaction of these two factors, on ability in expositive, narrative, directive, and aesthetic listening for both subject groups.

The null hypothesis was tested with respect to sightedness, speededness, order of test administration, level of intelligence, kinds of listening material, and type of school attended by the blind subjects. The .05 level was established as the acceptable level of statistical significance. When a computed variance ratio satisfied or exceeded the value required at the .05 level, the null hypothesis was rejected, and it was assumed that a real difference existed between the variables under investigation.

An analysis of the data pertaining to the total group scores of the blind and sighted subjects produced the following results:

1. The listening ability scores of the sighted were significantly higher than those of the blind subjects; the F-ratio of 5.296 between the two group means was significant at the .05 level.

2. No significant difference resulted from the order in which the regular and the speeded forms of the listening test were administered to the total subject group.

3. A significant interaction between sightedness and order arose from the fact that the achievement of the blind was higher when the regular unspeeded test was administered first (Order One), whereas the achievement

of the sighted was higher when the speeded test was administered first (Order Two). The 5.634 interaction F-ratio was significant at the .05 level.

4. The listening scores achieved on the regular administration were significantly higher than those achieved on the speeded administration of the test; the F-ratio of 39.264 exceeded the value necessary at the .01 level of significance.

5. A significant interaction between order and speededness arose because in Order One (regular administration first), the mean difference favored the speeded administration, whereas in Order Two (speeded administration first), the mean difference favored the regular administration of the test; the interaction F-ratio of 11.165 exceeded the value necessary at the .01 level of significance. Since the second administration of the test was favored in each instance, the differences may have reflected a practice effect.

6. The speededness factor did not operate discriminatively between the total listening scores of the blind and the sighted; the interaction F-ratio of 1.207 was nonsignificant.

7. The triple interaction F-ratio of 8.598 for sightedness x order x speededness, exceeded the value required for significance at the .01 level. In both Order One and Order Two a real difference existed between

the listening ability scores of the blind and the sighted. In Order One, the difference, significant at the .01 level at each rate, regular and speeded, favored the blind. In Order Two, the difference, which favored the sighted at each rate, regular and speeded, was significant in the speeded administration only; this significant difference was at the value required at the .01 level.

8. No significant difference existed between the listening scores of the blind subjects tested at the regular rate and at the speeded rate in Order One, but in Order Two, a difference, significant at the .01 level, favored the regular administration rate.

9. No significant difference existed between the listening scores of the sighted subjects tested at the regular rate and at the speeded rate in Order One, but in Order Two, a difference, significant at the .05 level, favored the speeded administration rate.

An analysis of the data pertaining to the four types of listening material produced the following results:

1. In expositive listening there was a significant difference in ability between the blind and the sighted subjects in favor of the sighted; the F-ratio of 6.634 was significant at the .05 level.

2. In narrative listening, there was a significant difference in ability between the blind and the sighted

subjects in favor of the sighted; the F-ratio of 18.312 exceeded the value required for the .01 level of significance.

3. In the directive type of listening, no significant difference existed between the ability of the blind and that of the sighted subjects; the nonsignificant F-ratio was .014.

4. In the aesthetic type of listening, no significant difference existed between the ability of the blind and that of the sighted subjects; the nonsignificant F-ratio was 1.512.

5. No significant difference resulted in the measured expositive, narrative, directive, and aesthetic listening scores, attributable to the order of test administration.

6. When the effects of sightedness and order were combined, significant interactions were revealed with each of the four kinds of listening material. With expositive material the interaction was significant at the .01 level, with narrative, directive, and aesthetic materials the interaction was significant at the value required at the .05 level of significance. The significant interactions arose because the listening achievement of the blind and that of the sighted did not conform to the same pattern within Order One and Order Two. With all four types of listening material the blind achieved

higher adjusted mean scores than the sighted in Order One; in Order Two, these results were reversed; the sighted subjects consistently achieved the higher adjusted mean scores in each type of listening. The narrative type of material was unique in that the mean scores of the sighted, before adjustment, were superior to those of the blind in both Orders. This superiority of the sighted in both Orders was not demonstrated in the other three kinds of listening material investigated.

An analysis of the data in Order One pertaining to listening ability at each of three levels of intelligence produced the following results:

1. In Order One, no significant difference existed between the mean listening scores of the blind and those of the sighted subjects classified according to three ability levels; the nonsignificant F-ratio was .129.

2. A significant difference existed between and among the mean listening scores at the three levels of intelligence; the F-ratio of 37.679 exceeded the ratio required at the .01 level. The listening ability of the high intelligence level was significantly superior to both the average and the low intelligence levels; the t ratios of 5.745 and 8.324 for the differences between the mean listening scores of the high and the average, and between the high and the low, respectively, were each significant at the .01 level. The listening ability of

the average ability level was significantly superior to that of the low intelligence level. The t ratio of 3.617 for the mean difference between the listening scores of the average and the low was significant at the value required for the .01 level of significance.

3. No significant sightedness x intelligence interaction existed, so it was assumed that the intelligence factor did not operate selectively between the listening ability of the blind and that of the sighted; the nonsignificant F-ratio was .178.

4. A significant difference in speededness existed between the mean listening scores on the regular and the speeded test administrations; the F-ratio of 12.526 exceeded the value needed for significance at the .01 level. The difference favored the regular or non-speeded administration.

5. A significant interaction between sightedness and speededness arose because in the regular administration there was no significant difference, whereas in the speeded administration there was a significant difference which favored the sighted. The significant interaction F-ratio of 8.239 exceeded the value required for the .01 level of significance.

6. The intelligence x speededness interaction, and the triple interaction sightedness x intelligence x speededness, were nonsignificant; the F-ratios were 1.507

and 1.956, respectively.

7. A positive correlation between level of intelligence and listening ability, at both the regular and at the accelerated speeds, was demonstrated by both the blind and the sighted subjects (Table26 ) in Order One. It should be noted that none of the interactions involving intelligence were significant and that the significant main effects would be assumed to apply to each of the subgroups, namely, an increase of mean listening score would accompany an increase in mean intelligence score.

An analysis of the data in Order Two pertaining to listening ability at each of three levels of intelligence produced the following results:

1. In Order Two, a significant difference existed between the mean listening scores of the blind and those of the sighted; the difference favored the sighted; the F-ratio of 7.252 exceeded the value needed for significance at the .01 level.

2. A significant difference existed between and among the mean listening scores at the three levels of intelligence; the F-ratio of 43.575 exceeded the ratio required at the .01 level. The listening ability of the high intelligence level was significantly superior to both the average and the low intelligence levels; t ratios of 6.134 and 11.175 for the differences between the mean listening scores of the high and the average, and the

high and the low, respectively, were each significant at the .01 level. The listening ability of the average level was significantly superior to that of the low intelligence level. The *t* ratio of 5.002 for the mean difference between the listening scores of the average and the low was significant at the value required for the .01 level of significance.

3. No significant sightedness x intelligence interaction existed, so it was assumed that the intelligence factor did not operate selectively between the listening ability of the blind and that of the sighted; the nonsignificant *F*-ratio was .647.

4. A significant difference existed between the mean listening scores on the regular and the speeded administrations; the *F*-ratio of 14.326 exceeded the value needed for significance at the .01 level. The difference favored the regular or non-speeded administration.

5. No significant sightedness x speededness interaction existed, so it was assumed that, in Order Two, the speededness factor did not operate selectively between the listening performance of the blind and that of the sighted; the nonsignificant *F*-ratio was 2.845. This finding would appear to contradict the finding in Order One. The contradiction is an apparent one only. The fact that the sightedness x speededness interaction was different in each order produced the significant higher

order interaction.

6. The intelligence x speededness interaction and the triple interaction, sightedness x intelligence x speededness were nonsignificant; the F-ratios were .002 and .201, respectively.

7. A positive correlation between level of intelligence and listening ability at both the regular and at the accelerated speeds was demonstrated by both the blind and the sighted subjects (Table 29) in Order Two.

An analysis of the data pertaining to the listening ability of blind subjects in integrated programs and in special schools for the blind produced the following results:

1. No significant difference existed between the mean listening scores of the integrated blind subjects and the mean scores of the subjects from special schools for the blind; the nonsignificant F-ratio was 1.305.

2. No significant difference resulted from the order in which the regular and speeded forms of the listening tests were administered to the total group of blind subjects.

3. A significant interaction between order and type of school attended, arose from the fact that in Order One the mean difference in listening scores favored the integrated group, whereas in Order Two the mean difference favored the special school group; the F-ratio

of 4.981 was significant beyond the value required at the .05 level.

4. The listening scores achieved on the regular administration were significantly higher than those achieved on the speeded administration of the test; the F-ratio of 7.900 exceeded the ratio required at the .01 level.

5. A significant order x speededness interaction arose because in Order One the mean difference favored the speeded administration, whereas in Order Two the difference favored the regular administration; the F-ratio of 5.732 exceeded the value required at the .05 level of significance. A practice effect may have been reflected here, since in each order, the difference favored the second test.

6. The type of school attended x speededness interaction and the triple interaction, type of school attended x order x speededness were nonsignificant; the F-ratios were 1.447 and .054, respectively.

## Conclusions

The following conclusions, presented within the limitations proper to the scope, population, and measuring instruments of this investigation, were supported by statistical findings:

1. In general, the measured listening ability of the sighted subjects was significantly superior to that

of the blind. This superiority of the sighted was manifested, (a) in the grand total scores, (b) in the Order Two total scores, (c) in the Order Two speeded administration, (d) in the Order Two ability classified sample, (e) in the total expositive listening scores, and (f) in the total narrative listening scores.

2. Type of listening material constituted a significant variable in the comparison of the listening ability of blind and sighted children in this investigation. The variance was indicated by the significant mean differences between the expositive and narrative listening scores of the sighted and the blind, in favor of the sighted, and the nonsignificant mean differences between the directive and aesthetic scores of the two subject groups.

3. Order of administration rate, controlled experimentally, did not in itself constitute a significant listening variable, but significant order interactions indicated differences between subject groups and subgroups. The sighted subjects, and the blind subjects from special schools, achieved higher listening scores in Order Two, in which the speeded administration preceded the regular administration. The total blind group, and the blind subjects from the integrated programs achieved higher scores in Order One, in which the regular administration preceded the speeded one.

4. A positive relationship was demonstrated

between intelligence level and measured listening ability. This relationship was manifested in every instance in which it was tested, both with the blind and with the sighted, and at both auditory administration rates.

6. Type of school attended by the blind subjects did not constitute a significant variable in total listening ability. A significant interaction, however, between type of school and order indicated that the integrated subjects performed better when the initial test was administered at the regular auditory rate; the subjects from the special schools for the blind performed better when the initial test was administered at the speeded auditory rate.

7. Speededness constituted a significant variable in measured listening ability. Scores achieved at the 175 word per minute rate were significantly higher than scores achieved at the 225 word per minute rate. The difference in favor of the non-speeded rate was demonstrated in each of the six instances in which it was tested.

8. Neither speededness, nor intelligence, acted selectively in influencing the scores of the blind and the sighted.

## Implications

The results of the present investigation prompted the following recommendations:

1. That in the education of the blind more emphasis be placed on formal training and practice in purposeful listening at speeded oral rates in order to prepare elementary grade students to meet the ever increasing educational demands at the high school and college levels.

2. That the educational listening needs of blind children be studied for the purpose of improving instruction in the kinds of listening which will benefit their future education.

3. That future studies with blind subjects include students from integrated educational programs as well as students from residential and special schools for the blind.

4. That further investigation be made to evaluate the significance of type of listening material as a source of variance in auditory comprehension.

5. That future listening studies conducted with blind children include the investigation of inter-school differences in auditory comprehension rates. In the present investigation, the significant interaction between order of test administration and type of school attended revealed an order difference between the two school programs which was such that the blind subjects from the integrated group accounted for the order variance between the blind and the sighted throughout the study.

6. Since the results did not show the blind to be superior in listening, the source of the "keener senses"

or "compensation" concept should be examined. Do the blind excel in perception rather than in understanding auditory stimuli? It may be that the blind are able to extract maximum information in terms of sound discrimination, but that at the level of verbal communication this superiority may not be being measured by the instruments used. The administration of taped musical or foreign language aptitude tests might cast some light on the question.

# BIBLIOGRAPHY

American Foundation for the Blind. *The Pine Brook report*. National work session on the education of the blind with the sighted in public and private schools, Group reports, No. 2. New York: American Foundation for the Blind, 1957.

American Foundation for the Blind. *Blindness: Some facts and figures*. New York: American Foundation for the Blind, 1963.

Anderson, H. A. Needed research in listening. *Elem. English*, 1952, 29, 215-224.

Anderson, H. M., & Baldouf, R. J. A study of a measure of listening. *J. educ. Res.*, 1963, 57, 197-200.

Arkin, H., & Colton, R. *Tables for statisticians*. New York: Barnes & Noble, 1950.

Ashcroft, S. C. The blind and partially seeing. *Rev. educ. Res.*, 1959, 29, 519-528.

Biggins, Mildred, E. A comparison of listening comprehension and reading comprehension in second and third grades. *Teach. Coll. J.*, 1961, 33, 54-55.

Bixler, R. R. & Foulke, E. Cureent status of research in rapid speech. *Int. J. Educ. Blind*, 1963, 13, 57-59.

Brodey, W. Sound and space. *New Outlook for the Blind*, 1965, 59, 1-4.

Buros, O. K. (Ed.) *The fifth mental measurement yearbook*. Highland Park, N. J.: Gryphon Press, 1959.

Caffrey, J. Auding. *Rev. educ. Res.*, 1955, 25, 121-138.

Carter, B. How to use educational recordings effectively. *New Outlook Blind*, 1962, 56, 332-334.

Cleland, D. L., & Toussaint, Isabella, H. The interrelationships of reading, listening, arithmetic computation, and intelligence. *Read. Teach.*, 1962, 15, 228-231.

Commission on the English Curriculum of the National Council of Teachers of English. The program in listening. In *The English language arts*. New York: Appleton-Century-Crofts, 1952. Pp. 328-347.

Cronback, L. J. Essentials of psycholigical testing. New York: Harper, 1960.

Crowley, F. J. & Cohen, M. Basic facts of statistics. New York: Collier Books, 1963.

Davis, C. J. Research on testing the blind. Proc. Amer. Ass. Instructors Blind, 1962, 36-38.

DeHoop, W. Listening comprehension of cerebral palsied and other crippled children as a function of two speaking rates. Except. Child., 1965, 31, 233-240.

Diehl, C. F., White, R. C., & Burk, K. W. Rate and communication. Spch. Monogr., 1959, 26, 229-232.

Duker, S. Listening. Rev. educ. Res., 1961, 31, 145-151.

Duker, S. & Petrie, C. R. What we know about listening: continuation of a controversy. J. Communication, 1964, 14, 245-252.

Duker, S. Listening and reading. Elem. Sch. J., 1965, 65, 321-329.

Early, Margaret J. Communication arts. Encyclo. educ. Res., 1960, 306-312.

Educational Testing Service. Cooperative sequential tests of educational progress, directions for administering and scoring listening 4A. Princeton, N. J.: Cooperative Test Division, 1957. (a)

Educational Testing Service. Cooperative sequential tests of educational progress, directions for administering and scoring listening 4B. Princeton, N. J.: Cooperative Test Division, 1957. (b)

Educational Testing Service. Cooperative sequential tests of educational progress, manual for interpreting scores, listening. Princeton, N. J.: Cooperative Test Division, 1957. (c)

Educational Testing Service. Cooperative sequential tests of educational progress, technical report. Princeton, N. J.: Cooperative Test Division, 1957. (d)

Educational Testing Services. Cooperative sequential tests of educational progress, teacher's guide. Princeton, N. J.: Cooperative Test Division, 1959.

Eno, M. A., & Stolurow, L. M. The effect of two recording speeds on learning. New Outlook Blind, 1960, 54, 39-48.

Erickson, A. G. Can listening efficiency be improved? J. Communication,, 1954, 4, 128-132.

Fairbanks, G., Guttman, N., & Miron, M. Effects of time compression upon the comprehension of connected speech. J. spch. hear. disord., 1957, 22, 10-19.

Fergen, Geraldine, K. Listening comprehension at controlled rates for children in grades IV, V, and VI. Unpublished doctoral dissertation, Univer. of Missouri, 1954.

Foulke, E., Amster, C. H., Nolan, C. Y., & Bixler, R.H. The comprehension of rapid speech by the blind. Except. Child., 1962, 29, 134-141.

Fouracre, M. H. Visually handicapped. Encyclo. educ. Res., 1960, 998-1000.

Furness, Edna, L. Listening and learning. Peabody J. Educ., 1956, 33, 212-216.

Gallagher, J. F. & Moss, J. W. New concepts of intelligence and their effect on exceptional children. Except. Child., 1963, 30, 1-5.

Garrett, H. E. Statistics in psychology and education. New York: Longmans, Green, 1958.

Goldstein, H. Reading and listening comprehension at various controlled rates. Teach. Coll. Contr. Educ. No. 821. New York: Columbia Univer., Bureau of Publications, 1940.

Good, C. V. (Ed.) Dictionary of Education. New York: McGraw-Hill, 1959.

Goodman-Malamuth, L. An experimental study of the effects of speaking rate upon listenability. Spch. Monogr., 1957, 24, 89-90.

Hackett, H. A. A null hypothesis: there is not enough evidence. Education, 1955, 75, 349-351.

Hampleman, R. S. Comparison of listening and reading comprehension ability of fourth and sixth grade pupils. Elem. English, 1958, 35, 49-53.

Hannah, Jo M. A study of listening from the Reusch-Bateson theory of communication. Unpublished doctoral dissertation, Univer. Denver, 1961.

Hartlage, L. C. Differences in listening comprehension of the blind and the sighted. Int. J. Educ. Blind, 1963, 13, 1-6.

Harwood, K. A. Listenability and rate of presentation. Spch. Monogr. 1955, 22, 57-59.

Haycraft, H. Books for the blind. New Outlook Blind, 1964, 58, 106-110.

Hayes, S. P. Measuring the intelligence of the blind. In P. A. Zahl(Ed.), Blindness. Princeton: Princeton Univer., 1950. Pp. 141-173.

Hollingsworth, P. M. The effect of two listening programs on reading and listening. J. Communication, 1964, 14, 19-21.

Hollow, Sister Mary Kevin, S.C.L. Listening comprehension at the intermediate grade level. Elem. Sch. J., 1955, 56, 158-161.

Iverson, L. Time compression. Int. J. Educ. Blind, 1956, 5, 78-79.

Josephson, E. A report on blind readers. New Outlook Blind, 1964, 58, 97-101.

Keller, P. W. Major findings in listening in the past ten years. J. Communication, 1960, 10, 29-38.

Kramar, E. J. The relationship of the Wechsler-Bellevue and A.C.E. intelligence tests with performance scores in speaking and the Brown-Carlsen listening comprehension test. Unpublished doctoral dissertation, Florida State Univer., 1955.

Lewis, D. Quantitative methods in psychology. New York: McGraw-Hill, 1960.

Lindquist, E. F. Design and analysis of experiments in psychology and education. New York: Houghton Mifflin, 1953.

Lowenfeld, B. Braille and talking book reading: a comparative study. New York: American Foundation for the Blind, 1945.

Lowenfeld, B. The visually handicapped. Rev. educ. Res., 1963, 33, 38-47.

Manshardt, Clarice E. The role of the public school system in the education of blind with sighted children. In Georgie L. Abel (Ed.), Concerning the education of blind children. New York: American Foundation for the Blind, 1959. Pp. 33-41.

Nichols, R. G., & Stevens, L. A. Are you listening? New York: McGraw-Hill, 1957.

Nichols, R. G. Listening throughout the school day. In M. Monroe, R. Nichols, W. Greet, & W. Gray, Learn to listen, speak and write. Book I, (Teach. ed.). Chicago: Scott, Foresman, 1960. Pp. 184-186.

Nolan, C. Y. Auditory communication in education of the blind. Proc. Amer. Ass. Instructors Blind, 1962, 39-43.

Nolan, C. Y. Reading and listening in learning by the blind. Except. Child., 1963, 29, 313-316. (a)

Nolan, C. Y. The visually impaired. In S. A. Kirk & Bluma Weiner (Ed.), Behavioral research on exceptional children. Washington, D. C.: Council for Exceptional Children, NEA, 1963, Pp. 115-154. (b)

North, R. D. An evaluation of the Step listening test for the independent school testing program. Educ. Rec. Bureau Bull., 1958, 72, 61-67.

Pearson, Margaret, A. The establishment of school and college ability test norms for blind children in grades 4, 5, and 6. Int. J. Educ. Blind, 1963, 12, 110-112.

Plessas, G. P. Auding and intelligence. Calif. J. educ. Res., 1963, 14, 90-94.

Rankin, P. T. Listening ability: Its importance, measurement and development. Chic. Sch. J., 1930, 12, 177-179.

Rawley Electronics. Model 53 audiometer manual. Rutherford, N. J.: Rawley Electronics.

Ray, W. S. Statistics in psychological research. New York: Macmillan, 1962.

Recording for the Blind. *Pathway to the mind.* Annual report. New York: 1963.

Rowe, R. Measuring capabilities of the visually limited. *New Outlook Blind*, 1963, 57, 94-96.

Russell, D. H., & Russell, Elizabeth, F. *Listening aids through the grades.* New York: Teach. Coll., Columbia Univer., Bureau of Publications, 1959.

Sargent, Ruth, F. The Otis classification test, form A, part II, adapted for use with classes of blind children. *Teach. Forum*, 1931, 4, 30-33.

Snedecor, G. W. *Calculation and interpretation of analysis of variance and covariance.* Ames, Iowa: Collegiate Press, 1934.

Spache, G. D. *Toward Better Reading.* Champaign, Ill.: Garrard, 1963.

Spicker, H. Listening comprehension and retention of intellectually normal and retarded children as a function of speaking rate and passage difficulty. Unpublished doctoral dissertation, George Peabody College for Teachers, 1963.

Stromer, W. F. An investigation into some of the relations between reading, listening, and intelligence. *Spch. Monogr.*, 1954, 21, 159-160.

Taylor, Josephine, L. The itinerant teaching program for blind children. In Georgie L. Abel (Ed.), *Concerning the education of blind children.* New York: American Foundation for the Blind, 1959. Pp. 43-48.

Toussaint, Isabella, H. A classified summary of listening, 1950-59. *J. Communication*, 1960, 10, 125-134.

Walker, Helen M. & Lev, J. *Statistical inference.* New York: Henry Holt & Co., 1953.

Wert, J., Neidt, C., & Ahmann, S., *Statistical methods in educational and psychological research.* New York: Appleton-Century-Crofts, 1954.

Wilt, Miriam, E. A study of teacher awareness of listening as a factor in elementary education. *J. educ. Res.*, 1950, 43, 626-636.

Winer, B. J. *Statistical principles in experimental design.* New York: McGraw-Hill, 1962.